

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

FEB. 21, 1955

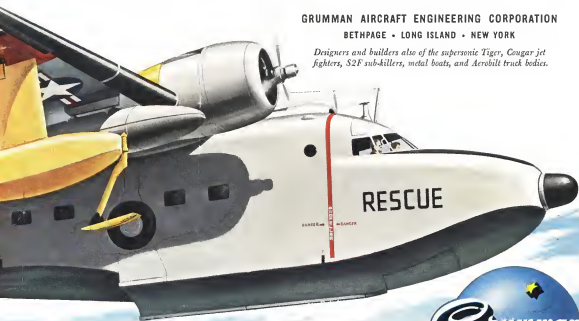
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B.F. Goodrich

FIRST IN RUBBER



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PLANS for Lockheed's Super Constellation called for two big baggage compartments in the lower section of the fuselage. But the panels lining the compartments presented some tough engineering problems.

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The new panels completely filled the bill. The picture above left, taken from

inside a Super Constellation's baggage compartment, shows panels lining one side and top.

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Aviation Week

FEBRUARY 21, 1955

VOL. 42, NO. 4

Editorial Office

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Washington 4 8 C—National Press Bldg., Phone NA 6-0344

Los Angeles 10-1115 Wilshire Blvd., Phone MA 6-4225

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AVIATION WEEK • FEBRUARY 21, 1955 • Vol. 42, No. 4
Member AIP and AEC

Published weekly by the Aviation Week Publishing Company, Inc., 36-130 W. 42nd St., New York 36, N.Y. (Night LD 4-3033). Founder: John W. Harlan. Managing Editor: Robert W. Martin, Jr. Editor: Robert E. Hale. Associate Editor: George Malone. Business Manager: J. G. Johnson. Promotion Manager: T. B. Olson. Production Manager: W. V. Cookson. Sales Representatives: J. C. Anthony, New York; H. F. Johnson, Cleveland; D. T. Brown and J. R. Connelly, Chicago; and St. Louis; R. P. Blanchard, Jr., Boston; James Cash, Dallas; William D. Lucas, Jr., Atlanta; T. David Wyckoff, San Francisco; C. F. McKeown and Gordon Jones, Los Angeles; W. S. Henry, Philadelphia; C. A. Kende, Detroit. Other sales office in Pittsburgh, London.



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Domestic

Rear Ada. James S. Russell has been assigned to replace Rear Adm. Apollo S. Smith in chief of Navy's Bureau of Aeronautics. He is coming to Washington, D. C., from command of Carrier Division 5, recently operating off the Taiwan Islands. Adm. Russell is ordered to Bethesda Naval Hospital and is expected to return.

Alleghe Airbus and **Southwest Airlines** have purchased the assets of Columbia Central Airlines for \$500,000. The deal includes four Martin 2-0-2s and two DC-3s with spares. Alleghe will get three of the 2-0-2s, plans to take possession of them in time to work the transport into its winter fleet.

Air Force B-47s have been grounded following two recent crashes. Glenn L. Martin Co., builder of the hydrogen bombjet, requested the white pending an investigation.

McDonnell F4H-1J Dewey climbed from a standing start to 10,000 ft in 71 seconds at Langley-McDonnell Airport, setting a new official record. The climbing took was the third set by Navy jet fighters in the past three weeks. North American F-100 climbed to 10,000 ft in 71.2 and 81 seconds late last month (Aircraft Week Feb. 7, p. 7).

Sea Rondo Technologies, future division of the Joint Congressional Marine Energy Committee, and he would not oppose the membership of T. Ross Gardner to be Assistant Secretary of the Air Force for Research and Development. This appears to clear the way for consideration. Senate Armed Services Committee approved the nomination last week, but because of Hickenlooper's request for additional time to consider the appointment the Senate failed to act in the closing days of the session. The Armed Services Committee has set Feb. 24 for a hearing on the nomination.

Mechanical assembly machine for building engine component, General Mills' new Autolab will go to later version. General Motors Corp. to speed production of large digital computers third for its defense. Autolab's estimated output 20 printed-circuit assemblies per minute.

John F. Wilkins, 62, designer and builder of the first aircraft and jet engine, died last week of heart failure. He was 62 and had been a member of the American Society of Mechanical Engineers since 1914.

John F. Wilkins, 62, designer and builder of the first aircraft and jet engine, died last week of heart failure. He was 62 and had been a member of the American Society of Mechanical Engineers since 1914.



New Eds Floats Make Cessna 180 Amphibious

First view of 215 hp. Cessna 180 Seaplane plane fitted with Eds Corp.'s new floats. How that gas float operates from land and water (Aircraft Week Nov. 13, 1954, p. 80). First delivery of the new floats is scheduled for May of this year. Wheel operation is by an electro-mechanical system. Nose wheel is full steering. The Hordland-Corbin has been taking a better on amphibious floats.

Protonic T-10 Co., died Feb. 13 in Cleveland.

Walter F. Bickelstein, 71, partner in aircraft instrument and control development and founder of Pacific Scientific Co., died Feb. 10 in Glendale, Calif.

Financial

Grumman Aircraft Engineering Corp. (New York, N. Y.) reports a net income of \$1,214,555 for 1954, a sharp increase over 1953's \$7,128,341. Sales and other revenues dropped to \$235,578,127 from \$241,014,156. The higher profit reflected Grumman's reduced loss in liability.

Delta-CAS Air Lines has received \$1.3 million of its 34% convertible (convertible) debentures, will refund them at 103% of the principal amount, interest to Feb. 21. The debentures were due Mar. 1975.

Donner Helicopters (San Francisco) has voted to increase the company's authorized capitalization from the present 1 million shares to 5 million for "contingent expenses" of its Dunbar, Conn., activities.

International

British Overseas Airways Corp. continued talks with the Harland-Canby was confirmed last week by British Minister of Transport and Civil Aviation Roy Casper, who said the air-

line will not exceed its sales for Comet 1s and 2s and may purchase three more series 3s.

Alleghe-airbus search line last week failed to find a Sabre-Belgian Airlines DC-6 that disappeared Feb. 13 in a storm. Report's Canadian flight was a flight from Brussels to Leopoldville, Belgian Congo. Twenty-nine persons were aboard.

Trans-Canada Air Lines plans to spend \$10 million on new equipment in 1955. Largest expenditure of the government-owned airline \$11,517,000 for new aircraft, partially all turbo-prop Vickers Viscounts, to be delivered this year.

Canadian Pacific Airlines has ordered two more Douglas DC-4s for its trans-polar route from Vancouver to Anchorage, now scheduled to open June 1 with weekly flights of combination coach-fair class transports (Aircraft Week Jan. 31 p. 7). The new DC-4s will be delivered early next year.

Aero C-130 MK is probably will go into service this year with eight Royal Canadian Air Force squadrons in Canada and four operating with the North Atlantic Treaty Organization in Europe.

Reocon Kowalewski, founder and president of Japan's wartime Kowalewski Aircraft Co., now Shin Meiji Industry Co., died Jan. 26 in Osaka.

Less White House Power?

The Pacific area case (AUGUSTAN WHITE Feb. 18, p. 11) has touched off interest in Congress to consider Presidential authority over international cases strictly to foreign policy issues.

First, Congress has produced, printed White House "intelligence" (a quasi-judicial function) and complained that the 1955 CAA Act sets CAA's function first on the domestic aspect—lack of the selection of conventional or international, as well as domestic cases. But the understanding that the President equally received CAA and authorized Pan American World Airways exclusively (instead of Northwest Airlines, as recommended by CAA) to provide Seattle/Portland in Hawaii air service has opened wounds.

• **Sen. Warren Magnuson**, chairman of the Senate Commerce Committee, plans legislation explicitly limiting Presidential prerogatives over international cases. "Pre-emptory, when taking a strong action, such as a treaty with CAA members, is the new law. 'No living into the open just what did happen' is the Pacific case. 'I am sure that the President considered what action he took correct under the CAA Act,' President announced. 'But perhaps some clarification of that act as to White House participation in such decisions is called for.'"

Different Kinds of Trouble

Foreign officials are concerned over reports appearing in daily newspapers and news magazines that the difficulties encountered by the Israeli Hawalei Hunter and the USAF's North American F100 in "high speed flight problems" of similar nature.

The Hunter is encountering its problems at Mach 9, the low end of the transonic scale, while the F100 doesn't get into trouble until Mach 1.4, well past the transonic stage and into the true supersonic performance category. Meanwhile, British Victor Supersonic Swift, since a strong indication for offshore development was "difficult," apparently hid completely from the Soviet Air Force fighter pattern due to control problems at about Mach 9.

Hiding Behind 'Security'

House armed services investigating subcommittee, headed by Rep. Edward R. Roybal, has taken the lead to stop the practice of government departments of hiding information behind a curtain of the law "security"—which congressional committees have long complained has handicapped their investigations.

New rule adopted by the House subcommittee will require all government officials whose presentation is to involve matters affecting security to notify the chairman at least 24 hours in advance of their scheduled appearance, and submit specific statements on containing non-classified material and the other containing the classified material. The specific publication for the classification of the security material will have to be typed. The subcommittee will consider in valid, only two types of prohibitions.

• It is accordance with the standards for security classification prescribed in the President's executive order of December, 1953, detailing factors which require security classification.

• Matters which involve "executive policy"—or are not national security because they involve inter-administration matters. If the type justification is given, the rule demands that the subcommittee will make the determination as to whether the information should be released.

The House subcommittee's action followed the refusal of Navy Secretary Charles Thomas to testify in public sessions on the leg in the naval aircraft procurement program on security grounds. The transcript of the closed door session was later submitted to Thomas to make deletion possible by security. Thomas' deletion was made in fact, some subcommittee members found it difficult to denigrate the changes Thomas made for guaranteed reasons from the security changes.

Weeks versus Willis

Revels between Secretary of Commerce Stanley Weeks and Willis H. Harrison, Charles Willis over who is going to dominate the Administration decision on air transportation apparently is missing.

It is widely agreed in congressional circles that the two were drastically opposed on the recent Pacific case—Weeks strongly supporting Pan American World Airways' position and Willis supporting Northwest Airlines' position.

Key Republicans on Capitol Hill say, privately, that they believe Weeks presented a one-sided picture, highly favorable to Pan American, to the White House on the case. They point out that the President quickly changed his mind on the case after obtaining "additional information" from Magnuson's Sen. Edmund Tamm, a solidified influence in Republican circles.

Fall-Out and Dispersion

Air Force Emergency Commission disclosed a major reason for recent Defense Department emphasis on broader mobilization here and under dispersion of defense industries (AUGUSTAN WHITE Dec. 16, 1954, p. 11).

The defense leader, dispersion in last year's hydrographic bomb test that the explosion yielded 7,000 sq. mi. at the Pacific with radioactive fallout. Defense Secretary Charles E. Wilson said he has known about the fallout problem for several months. "The only thing you can do," he said, "is to have as many sources of production—dispersion of bases and sites, etc.—as is practical."

Missile Report

Senate Appropriations Committee is annoyed at Defense Department's failure to submit a report on the guided missile program, due Jan. 15. The committee directed the Secretary of Defense to make an investigation last year, after testimony indicated depletion of effort among the services and failure to standardize missiles for approximately the same mission. The report is now in the hands of Defense Department controller, Assistant Secretary W. J. McNell, for "coordination."

Bright Feeder Outlook

Congress appears set to establish a special board on passing legislation authorizing permanent contribution for local service airbases. Senate and House Commerce Committee expect to conclude hearings this week.

—Washington staff

Aerial Logistics Plan Takes Big Step . . .

USAF Asks Airline Bids for Global Airlift

• Thirty scheduled and nonscheduled carriers compete for roles in network to overseas and Alaskan depots.

• Length of commercial transport operations is indefinite: One Air Force faction seeking purely military system.

By G. J. McAllister

Air Force's plan for a global aerial logistics system moved a long step last week.

But controversy went out from Air Materiel Command to a list of 30 scheduled and nonscheduled commercial airlines to provide scheduled air service for the USAF Air Materiel Area bases in the United States to depots in England, France, French Morocco, Japan, Alaska and Greenland.

MATS is to Direct—approximately 11 DC-4s, at their full complement, will be needed initially. Between 40 and 50 non-engine transports eventually will be used with a low aircraft being added each month. Service is expected to start in 30 to 60 days.

The first contracts, to be let on a per plane-mile basis, will be for a three-month period. Other contracts will be on a similar short term basis.

Commercial aircraft are being and are becoming the Military Air Transport Service is not able at this time to use the airlift equipment. Some MATS assets will be used in the initial service, and the entire operation will be performed under the direction of MATS.

Support Plan—Air Materiel Area is involved in Guatemala City (Tucker AF, Gu.), San Bernardino (Norfolk AF, Cal.), and Wright Patterson AF, Ohio.

There is how the support function will work.

Wright-Patterson will support overseas depots at Baton Rouge, La., Chateaufort, France, and Nonnewood, French Morocco. Bernardino is the northern Air Materiel Force in Europe. Chateaufort is the aerial Air Materiel Area in the southern.

Guatemala City Air Materiel will support LaFol AF, Alaska, and Thule Air Base, Greenland.

San Bernardino Air Materiel will support Tokyo, Japan, possibly depots for the Far East Air Force.

Frequency of flights has not been determined, however, a minimum of 10 flights will be made to Tokyo, Japan, during the three-month period.

Profitable Rate—Service will be on a point-to-point basis, directly from the Air Force to the overseas depot. It will be sufficiently flexible, however, so that cargo can be delivered directly to a major overseas base instead of the depot.

Flights returning from overseas bases will carry cargo back to the U. S. air bases en route.

Biggest hurdle is being tried first by the Air Force since the flow of provisions around the pipeline has been a continuous predictable rate of nothing a positive response between the surface and airlift system.

Planning Pass-Off—The region will be stepped on lightly, deflected, replacing the age, hours, and expense for the military. The service has a special Officer "by-law" issue, possibly electronic equipment, later will be included in the airlift.

The transportation of USAF's airlift will be a major project of the reorganization of major months of plan.

Air Logistics

Air Force's plan for a double-lifted exchange report on USAF's expanding on logistics service in the Pacific.

Gen. E. H. McAllister reports from the Pacific Air Force plan to begin overseas airlift of cargo and other supplies from major commercial carriers. Charles Wiley, writing from Alaska (p. 14), describes one of the first scheduled USAF attempts to supply an isolated combat unit by an aerial pipeline.

Air Force Secretary Harold E. Talbot recently said.

"This project provides a good example of the use of air transportation."

"We estimate that the time of the cargo airlift cycle will be reduced from 270 days now required by surface transportation to 100 days by air transportation."

"We also estimate that our overall cargo requirements will be reduced by about 25% in this operation. A 1954-1955 cargo agreement is expected to be a good example of what we can do with cargo that a single 801 costs about \$75,000, a 147 costs about \$50,000, and a 447 costs about \$75,000," he said.

USAF has been using the commercial airlift for cargo domestically for nearly a year. The present domestic system will be used in a smaller form. U. S. depots to the three Air Materiel Areas in the overseas service.

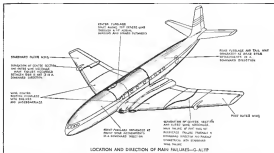
The domestic system, called Legat, a private line C-46 transports weekly between all of AMC's major depots and its aerial ports of embarkation (AUGUSTAN WHITE Jan. 1954, p. 11).

Domestic Airlift—Two nonscheduled airlines are providing the service. They are American Export and Export Co., Mexico City, which services airports in the western half of the U. S., and Capital Airways, Nashville, Tenn., which handles the eastern half.

Plans for the establishment of the Legat system, Project Skyway, was started in an overseas airlift program to handle 14,000 tons per week. What was Air Force's East-Hallway, Conn., plant to Canada's B-100 monthly line in Fort Worth, Tex., and calls of the Strategic Air Command were B-36, B-52, and a DC-4 for the operation, and the project was later taken over by American Export and Export Co. with C-46s.

Project Skyway proved that with considerable aerial movement and ground control it was possible to move nearly 100% payload and costs of 10 cents a ton-mile.

USAF now is building a fleet of air transport aircraft, the Lockheed C-119, the Douglas C-119 and C-119 to operate over an aerial logistics system of the future.



Comet Verdict Upholds RAE Findings

Final verdict of the Court went of enquiry unobscuringly buried the decisions of Britain's Royal Aircraft Establishment. The accident to de Havilland Comet G ALYP off FBO Jan. 18, 1954, was caused by structural failure of the cabin brought on by fatigue.

Lacking positive evidence for the accident to G. ALYX near Naples Apr. 8, the court was willing to accept the RAIL theory as a possible cause.

Beyond that, no specific responsibility was fixed and no blame attached to any parties. RAE was right, and nobody was wrong. But some detailed engineering of test and design procedures was needed for future Boeing aircraft.

Thus did Lord Cohen, sitting as final arbiter on the aftermath of tragedy, summarise the findings of the 21-day

Return Comets

East Canadian Air Force's two de Havilland Comet 1A jet transports are expected to be shipped back to the manufacturer in Great Britain for rebuilding.

The two planes cost RCAP \$4 million, with spare parts. They have been grounded since only last year pending outcome of the British Board of Inquiry into the two Canair crashes at Rome.

Others, however, say de Vriesland has offered to rebuild the two Cornish compounds—either for maximum shelter

ECAF had used the Comets in its transport operations before receiving

Second is the true static strength of the Corast cubes. There are accounts believing that tests made only on a section of the cubes were misleading. Therefore, says Lord Cohen, a test conducted in the tank at RAE, with the most comprehensive explanation of the stress distribution, would be useful."

Third is the Coast control system. Subject of some controversy and new opinions, Land Cohen said the control system of the Coast deserves reconsideration from two angles: Reduction of "breakout" fees and incorporation of positive feed.

"Clean Hall-De Hasbrouck engineers were not blamed by the findings, the company was proceeding with what was then regarded as good engineering practice."

A list of proposed changes in Coast range was submitted to the coast during the inquiry, and de Cleveland publicly started the steps it is taking to realize the Coast 3.

After the release of the court report, Mr. Harvilland offered no comment, saying the fairness and clarity of the procedure. "Careful note will be taken of the findings and the recommendations made," the company said.

There was no fault to find with the present system of factory inspection, done by the manufacturers and supervised by the Air Branch of the Board.

► **ARJ Views**—During the hearing, Sen. Leland Hyde, representing H. M. Atorney General, listed the practical steps

proposed by the Air Registration Board to tighten some of the procedures in design and operation of future aircraft.

The board recommended complete tank tests of fatigue behavior, similar to the ones done at RAE. Two prototype structures also will have to be tested—one statically and the other for fatigue. There is some technical opinion strongly against the tank tests. One specific objection has been that electrolytic action between steel tank and aluminum structure produces deterioration.

The board proposed the addition of one or more members—specifically selected for their expertise in the academic field.* One already has been appointed.

The value of fully instrumented flights on proposed routes with the new aircraft was underscored, as was the importance of frequent research.

Lord Cohen disagreed with one suggestion that an active pilot be appointed to ARB because, in effect, he would not be able to continue as an active pilot and spend adequate time on ARB problems. Lord Cohen further suggested that in the future more use be made of the flight test facilities at the Ministry of Supply.

"When these measures have been applied and the test completed," said Lord Calves after ending his first news conference, "de Havilland will no doubt ask ARB to recommend the grant of a certificate of airworthiness to the

reassigned Counsel. "I now perhaps express the hope that this procedure will reassure the public as to the integrity of premium cabins and will satisfy Sir Arnold Hall's confidence that the Counsel's work will be again."

NAA Gets \$5-Million

A \$5 million contract for F&B Sabre jet fighters for Mutual Defense Assistance Pact nations has been awarded to North American Aviation, Inc.

The manufacturer says improvements of long lead-time items needed to fill the order has been started at the Los Angeles plant. Plans will have some state improvements over the earlier F-80s and still will be powered by the General Electric J47-7 engine. The F-80F has been out of production since May 1964.

General Electric Co., Cincinnati, tailcoat and afterburner assemblies, \$314,340.

Northrop Aircraft, Inc., Anaheim, Calif., photographic window panes, 5305,156



XY-3 PRODUCEMENT will begin sometime in 1993, if heavy construction starts soon.

Bell XV-3 to Probe Convertibility

By David A. Anderson

Ft. Worth—Bell Aircraft Corp. XV-1 convertiplane, shown publicly for the first time last week, gives the jet-powered VTOL test vehicle as the company's second contribution to the solution of vertical flight problems.

The XV-7 is the second tangible result of the Army's interest in the new category of aircraft: one was McDonnell Aircraft Corp.'s XV-3 (Aviation Week Feb. 15, 1994 p. 12). The XV-2, a Sikorsky design featuring a single-bladed rotor that could be stopped for forward flight, never was carried beyond the design stage.

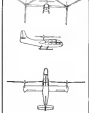
► **Explosion:** Primary purpose of the XV-7 design is to probe the areas of possible niches for the configura-

tion. The Army considers the growth phase as a tactical vehicle for absorbing, reorganizing, developing, testing and lesson, and soon future possibilities in large and small transports.

combine the better characteristics of the helicopter and the airplane. Speed range is from hovering to an estimated 175 mph., stretched faster than the fastest current helicopter and.

Wingtip rotors of the XV-7 provide lift and propulsion. In the horizontal plane, all three have a direct lift. When the conversion plane is all the ground, the rotors are tilted forward and lift is converted into thrust for forward flight.

The scans are tilted with electron optics in the anode at the waigage. The operation takes about 10 seconds, can be stopped or reversed anywhere along the way, and can be done in level light, climb or dive.



FILE XV-3 (face view) reveals layer

Snease to Take Over Breguet

(McGraw-Hill World News)

PARIS—Snease Louis Breguet shortly will be taken over by the government-owned Societe Nationale des Constructions Aeronautiques du Sud-Est (Sneac), a merger that threatens to shut off an investigation of financial operations of the multinational sector of France's aircraft industry.

Gen. Pierre Koenig, a deputy of the French National Assembly, asked the government to open an inquiry into the competitive financial treatment accorded in Breguet, Sneac and its sister company, Societe Nationale des Constructions Aeronautiques du Nord-Ouest (Sneon), in this production of transport aircraft.

Breguet ran into serious financial trouble with the production of the "Dassault" 58, now flown by Air France under the name "Falcon." Production of the plane was suspended after total output of only 15 aircraft, including prototypes. Breguet's losses on the operation are said to be about \$5,000,000.

It has been reported, although never confirmed, that the company had been given resources of a large-scale production for the plane until Feb. 24, presumably to be used by Air France to the French air force.

The "Dassault" is a two-engine transport capable of carrying 187 passengers.

working stress a small fly-like machine. Fuel capacity is 100 gallons of 91-96 grade gasoline.

► **Demonstration.**—Unveiling of the XV-3 was the dramatic highlight of an outdoor event by top Pentagon officials, headed by Frank H. Rogers, Assistant Secretary of the Army for Logistics, Research and Development. But several cold and a driving wind forced the rollout to be an unexciting scene as the Bell experimental light test barge at their Harkness Point test facility.

The XV-3 was unveiled off the floor in a test flight, although behind a green curtain obscuring it from the audience of Army, Navy and Air Force officials plus representatives of the industry and press. While present, General Robert L. Holman, commander of the prototype behind the design, the curtain was opened on the XV-3. Next Stone-Toe drive tests, one the most scheduled event in the XV-3 program. These will provide flight test information to recover the better part of our loss. Placement of the craft, ensuring it meets performance demands, will begin sometime in 1985, say some Army officials.

Exhibition of the XV-3 followed a tour of Bell's helicopter facility at

gen, based on hopes abroad despite transatlantic efforts by the manufacturers and the French government.

What attracted Koenig's attention is the fact that neither of France's other major efforts at building transport aircraft for the last decade of a success. Sneac's "Aquitane" and Sneon's "Hercules" failed to find firm sales without operators.

Koenig's question is simple: Did the government use the same system of payments for all three planes? Or did the multinational companies get special deals mostly?

Regardless of the outcome of the inquiry, there is little doubt that the Breguet collapse is indicative only of the weak position of French aircraft production. The intense market both military and civilian is weakened to support the industry in its present state. (Two-thirds of the industry already is in government hands.)

April four were seriously injured when an military plane in Italy and in Latin America, French aircraft have not at tactical losses here.

Overall aircraft production in France, measured in terms of volume, was only 325 less in 1974 than in 1975. The total number of scheduled aircraft produced fell from 680 in 1975 to 481 in 1974.

First. One of four plants in the industry owned by Bell, the principal product at Bell is the Navy's HH-3E anti-submarine cutter. The other is usually those in Civilian test facilities. Bell's Model 47 and its variants are made in the former Globec aircraft plant, now operated by Bell.

Bell Helicopter Design Wins Stiff Competition

Bell Aircraft Corp. last week was selected over seven other manufacturers to develop a new utility helicopter for the U.S. Army.

In the hottest aircraft competition of Army history, a trailing race that at times more military attention than Army Air Force and Navy design efforts, Bell was awarded a contract for preliminary engineering and a mockup.

► **Model 212.**—The helicopter will have a payload of 500 lb. Cruising speed will be 180 knots, maximum ceiling of 8,000 ft and rate of climb 1,500 ft per minute. It will be used for evacuation of wounded, utility missions and as an instrument trainer.

Until it gets a military designation, the new machine will be called by

at Bell designation, Model 212. It is a single rotor configuration, similar to the Bell 47G-1 but slightly larger. The 47G-1 is a two-blade helicopter design similar to the military helicopter design (Aviation Week Sept. 13, 1974, p. 17).

► **Previous competition.**—Of about 47G-1, of which only one model was built for demonstration purposes, are similar to those of the new 212. It has a gross load of 2,500 lb., service ceiling of 10,000 ft. When it was shown to the military, Bell officials said they also were sending out the commercial market for an aircraft of this type.

► **Previous trials.**—In the military helicopter trials, the new 212 will fall far from the Bell H-13 Model 47 and the Sikorsky H-19 (p. 55). Both of these aircraft are now in Korea. The H-19 was used for evacuation missions and tested in performance in some parts of the theater where conditions ranged from 3,000 to 8,000 ft. The H-19 is larger and heavier than the new 212 and presumably more expensive to operate.

Additional resources include probably the procurement of some general dynamic parts of the turbine Model 47 into the new 212. Bell has built more than 1,000 of the smaller Model 47. The Army in the past year, while the competition was under way, has given increasing emphasis to the importance of reduced maintenance costs.

Inclusion of maintenance training as one of the Army missions for the new model indicates that the company has made substantial progress in development of blind flying methods. Army maintenance efforts have involved the Bell program in this field and have been given up-to-date information on the state of its development.

► **Eight proposals.**—Army interest in the utility rotor competition, started a year ago, was evidenced by design from eight manufacturers. Some of them, including Bell, submitted more than one proposal. All entries would exceed high pressure to meet Army deadlines. First evaluation of the proposals was made by USAF, which acts as a purchasing agent for the Army. Final assessment of Bell's selection was made by the Department of Defense.

There has been no indication of how many Model 212 helicopters will be needed by the Army. Current plans call for procurement of only a limited number for test and evaluation, but the number is known to outstrip by 40 needs for a helicopter of this type.

Limited payload capacity of smaller helicopters and lack of helicopter design factors in favor of the new design. The 212 will be built at Bell's Heli-Copter Division plant near Ft. Worth. Yes, where the Army recently called out its second configuration, the XV-3 (Aviation Week Feb. 14, p. 15).

Puzzle for Fuel Booster Pump Experts:

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Write for the complete story of "Resistance Welding At Work" on the F-80D contained in Vol. 4, No. 4, and Vol. 3, No. 4.

Northrop's full acceptance of resistance welding is based on many years' experience—the 1935 experimental flying laboratory "Gnomes" with spot welded wing also proved weld integrity. In the World War II P-60 Black Widow with spot welded twin tail booms proved extensive production economy of 60% over riveting.

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Link to Build New Pilot Trainer

Flight Safety, Inc., (a subsidiary) training corporation for businessmen and airline pilots, has entered into a contract with Link Aviation, Inc., for design and production of the first two-engine, two-place propeller and jet-propelled flight trainer said for commercial use.

Both companies emphasize that the unit will be a light "trainer," as distinct from a simulator.

Acquisition of the trainer will be one moving step in an overall expansion program that has seen Flight Safety grow from a refresher training corporation for business pilots and pilots of medium-size airlines into a firm offering not only training but also a comprehensive advisory and consultation service designed to help corporations in the selection, operation and maintenance of aircraft (AVIATION WEEK Oct. 31, 1954, p. 37).

► **Flight Trainer**—The new trainer, designated by Link as the E-600, will be called a "light trainer" by Flight Safety. Delivery is expected the latter part of this year or early 1956. The unit will be used in the firm's advanced training program for pilots.

Specifications for the trainer are the result of a joint effort on the part of both companies. It is to be of side-by-side cockpit configuration. The two firms claim it will have the most complete modern aids available of any light trainer in production known.

The Link unit will simulate the two complete and independent powerplants found in a typical two-engine aircraft. Each simulated engine will operate as an entity in itself and will have its own complete set of instruments and controls. Link says this feature makes possible the simulation of conventional engine operation and its effects.

► **E-600 Features**—Both companies say their contract represents the first commercial sale in the U. S. of a light trainer according to a DG computer system. Link has patented such use of a DG system in its latest simulator being produced for Air Force. Other advantages cited are:

► Complete radio facilities permit for precise simulation of the complex in-flight problems and situations with which pilots are confronted.

► Pilots can arrive up to four radio stations simultaneously in the trainer, making possible a thorough pilot drill on radio aids and procedures—including approaches, takeoffs and later on traffic control procedures.

Included in the radio equipment to be provided for the unit are: two ADF low-frequency and two ILS-VOR receivers, marker beacon system, two VDF receivers, HF transmitter, radio navigation equipment, and master control.

The last simulating station can provide any combination of headset,

Civil Plane Shipments Increase 21%

Shipments of civilian aircraft in November increased 21% over October as shown by airplane weight, Commerce Department reports. The total for November was \$79,238,000.

Weighted index for civil planes weighing 3,000 lb. or more amounted to 214 at the end of November, 7% less than the October reading.

	November 1954	October 1954	November 1953
Completed aircraft:	288	174	275
By weight of aircraft:			
Less than 3,000 lb.	23	155	247
3,000 lb. and more	265	19	35
By number of planes:			
1 to 5 place	151	147	247
More than 5 place	30	27	35
By total hp., all engines:			
Up to 215 hp.	156	145	247
401 hp. and more	32	29	35
Total value of completed planes (1000 constant):	\$29,099	\$25,409	\$38,022
Aircraft:	15,199	15,409	29,909
Less than 3,000 lb.	5,901	1,194	2,514
Aircraft parts:	6,506	6,508	8,714
Total of aircraft engines and parts:	\$12,157	\$11,867	\$14,266
3000 and more:	5,119	4,611	7,371
Engine parts:	4,940	7,355	7,129

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Unit flexibility—Flight safety may flexibility in the unit's use is insured by its simulation of instrument flight conditions, engine operation, performance, stability and control reversals of a modern two-engine aircraft.

Overall design includes a cockpit section, an instructor's or instructor's panel and steel cabinets housing the computer mechanisms. The two-page cockpit will contain all of the normal flight instruments—both for pilot and copilot—with a complete set of engine instruments on the instrument panel. The instructor's or operator's unit,

located immediately behind the cockpit, will include all controls necessary to set up a training "flight" in any part of the globe and to make necessary adjustments and settings during any portion of the "flight."

In addition to these facilities, the unit will be equipped to train crews to cope with emergency situations, such as partial or complete power failure, engine fire, radio or instrument failure, wing drop and many others. The instructor will be able to introduce such hazards at any time during a training flight and, through warning lights on his panel, tell whether the crew performed correct remedial actions.

Good, Military News—According to Lick president E. Allen Wolfson, the project meets a "long-expressed desire by both commercial and military aviation for a high performance, two-engine trainer with simulator quality but at a radically flexible performance to be used as a general trainer."

"Also, most important," adds Flight President A. L. Ullrich, "the simulator will make a substantial contribution to the future of safety in the air."

Three TWA Officials Sell 4,100 Shares

Disposal of 4,100 common shares of Trans World Airlines stock by three officers and directors of the company is reported by Securities and Exchange Commission.

The TWA transactions: Warren L. Brown, chairman of the board, disposal of 3,000 shares, leaving a holding of 5,990; Ralph S. Brown, president and director, disposal of 1,000 shares, leaving a holding of 1,650; John L. Weller, vice president, disposal of 100 shares, leaving a holding of 60; acquisition of 533 shares by E. C. Cooke, vice president and director, making a holding of 1,124 shares was also reported.

Other transactions reported in SEC's report for the mid-December to mid-January period:

Aero Supply Mfg. Co. Disposed of 3,410 common shares by Leo S. Brown, director, leaving a total holding of 7,410.

McClellan Co., Inc. Disposition of 148 common shares by O. H. Brown, director, leaving a total holding of 2,210; acquisition of 200 common shares by George Brown, making a total holding of 1,870.

Shaw-Walker Inc. Disposed of 4,400 common shares by Frank C. Lachapelle, director, leaving a total holding of 8,300; acquisition of 700 common shares by Paul C. Lachapelle, making a total holding of 1,000.

Leontine Airlines Inc. Acquisition of 310 common shares by Arnold W. Adams, director, making a total holding of 800; disposal of 410 common shares by A. A. Adams Jr., officer, leaving a total holding of 1,700.

W. J. Adams, making a total holding of 5,040; acquisition of 4,444 common shares through exercise of options by S. B. J. Adams, officer, making a total holding of 8,000; acquisition of 3,000 common shares through exercise of options by Thomas J. Adams, officer, making a total holding of 1,800; disposal of 210 common shares by Thomas J. Adams, officer, leaving a total holding of 8,000.

Shaw-Walker Inc. Disposed of 1,000 common shares by Frank C. Lachapelle, director, leaving a total holding of 8,300; acquisition of 700 common shares by Paul C. Lachapelle, making a total holding of 1,000.

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




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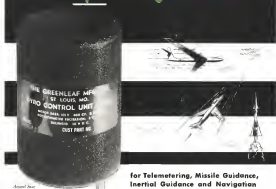
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for John D. Ryan, officer and director of 195 common shares having a total holding of 1,100.

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Richard & Wanda Nelson. See Division of 195 common shares by Richard J. Nelson, officer having a total holding of 1,100 shares of 1,000 common shares by Wanda Nelson, officer having a total holding of 1,100 shares of 1,000 common shares by Richard J. Nelson, officer having a total holding of 1,100 shares of 1,000 common shares by Wanda Nelson, officer having a total holding of 1,100.

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Lord Hives Visits U.S.

Lord H. H. Hives, Rolls-Royce executive chairman (left) visits a target door at the plant of Republic Corp., Via Napa, during a tour of military California aircraft facilities. Here Whitley C. Collins, president of Republic and its parent firm, Northrop Aircraft, Inc., explains the door's features. The men also discussed the new 1,100-hp Pratt & Whitney jet which Republic will use in its upcoming important target door being developed for USAF. (Aviation Week Oct. 13, 1954, p. 21)



THE GREAT of this new bearing has been a big step in the ability of its power plant to break down to reduce more heat, more easily of all. Each jet engine now as a life-saving, but with which general testing before even when all the lubrication has been to replace lubrication at the maximum high speed developed by jet engines.

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Today they're setting performance records in the late-1950s when they're saving planes and pilots in the air!

For these conventional new roller bearings, perfected by Hyatt engineers, have proved beyond a doubt that they can take the oil-failure problem. Applied to the components and turbines of jet engines, Hyatt "Safety Bearings" have performed perfectly for more than 30 hours with no lubrication whatever. This historic contribution to aviation safety once again demonstrates why we say: When you're faced with a formidable "bearing barrier," come to Hyatt for the Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



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VERTICAL FRAMES provide mobility for easy-handling press-frame fixtures (shown in inset), moving parts from substructure.

Convair Experience Shows How . . .

Automatic Riveting Shaves Tolerances

Riveting tolerances will be shaved very fine as Convair's opening segment B-55 jet bomber. To cope with the unusual change in riveting sequences, Convair-Ft. Worth manufacturing research engineers have put the fruits of four years of study into a new

setup built around automatic and semi-automatic processes.

The new automated fastening system, set up early last December, is at work now at Ft. Worth on subcontracted Boeing B-52 Stratofortress and Convair-Dodge F-102 parts, parts

to the important role it will play in B-55 production.

Switch to Automatic—Company engineers see many other possibilities in the philosophy of substituting automatic for manual assembly procedures and refining operations such as drilling,



DIAPHRAGM CLAMP DETAILS. (a) pivot, (b) adjuster, (c) retainer, (d) wedgepin, (e) sleeve, (f) block, (g) handle, (h) threads for engaging holder threads. Clamp is shown with spur cog channel (left), no-cogness (right).

drilling, spotwelding, tacking, tap-
ping, counterboring and others.

They envision subassembly machinery set up in long rows, with position-
ing equipment moving work from one machine to the next, changing tools not required in a particular operation.

Such processes should provide broad new fields for production machinery makers and suppliers of fixtures and tooling devices, while increasing uniformity and product quality for the airborne manufacturer.

Automating the riveting process, as witnessed by Lockheed A-104, test equipment, manufacturing research section of Convair-Ft. Worth's tooling department, shows how important some of these benefits can be.

Had this process been available at the time of B-36 development, its rate under that at least 30% of the over-

15,000 man-hours used in installing an estimated 3.2 million rivets, screws and bolts could have been saved. In addition, the new method would have saved about 55% of the \$3.5 million in investment in drilling guns, backing bars, drills, spacers and the like used on the B-36.

On the B-36 less than 12% of applicable assemblies were represented by automatic riveting, right now, Ft. Worth installs 78% of fasteners using automatic or semi-automatic methods. "Hand riveting is used as a last resort," the sold department says.

The close tolerances set today can be obtained. Where, on the B-36, permit tolerances of many riveted areas then had allowable plus or minus tolerances of .0102 in., comparable B-55 tolerances must be held to plus or minus .004 in., Ray says.



ADJUSTABLE TELEVISION STAND holds fixture when hand tool operation not necessary.



PICTURE STORAGE takes little room. Fastener row riveting operation takes only 7.50 sq. ft.



DIAPHRAGM drills, counterbores, bores and broods 5,000 inch units in under wing panel.

To obtain these tolerances, Convair considered two possibilities:

- Build the assemblies with accurate material, then trim them to desired size and shape using precision drilling.
- Machine tolerance "growth" by controlling and restricting all detail parts in place throughout assembly.

Initial studies proved that precision riveting would take at least three times the present riveting machine shop capacity and also entail considerable manufacturing costs. In addition there was a high potential of machine shop slip.

Convair then decided to select the riveting process and the problem was assigned to Ralph Folmer, chief tooling engineer, to his assistant, G. K. Gentry, director of manufacturing research and development by Ft. Worth Division's tooling activities.

Automated Riveting Lines—These are the concepts that Convair-Ft. Worth has developed for speeding riveting processes.

- One station two 1550 riveting tools set up in parallel and directly opposite to one another.

- Another setup, for much larger assemblies, utilizes parallel horizontal tracks, each with a General Brothers Dynamic in the center. The tracks have twin rails and end cradles for positioning the work. This equipment has additional substructure of telescoping perforated tube permitting and photocell system to work out the proper operational sequences.

On the vertical track setup, the first track starts from the fixture storage area, runs straight to the production tool detail rack bars and put into three separate riveting machines.

The other track is located in front of five other rivet centers, three facing out way and the other two the opposite way. Beyond these are two Chicago Pneumatic 527 hydraulic screw racks. At the end of the track is a cleanup area with its portable pneumatic hand tools.

Gates at each end of the tracks allow transfer of incoming fixtures and parts from one track to the other.

Fixtures are lifted from the storage racks by overhead overhead hoist and loaded on the carriages. Carriages first move through the detail rack bars and into where structural details are secured in position. Then they go to the fast automatic center, where angle irons are fastened to the webs.

The adjusted gate then moves the unit assembly to the opposite track where the fast automatic rivetter performs their specific tasks. After this, the carriage goes to the cleanup area where operations uncorrectable to be adaptable to autocorrecting are handled. From here the work goes to the end of the track where a cycle-checker fi-

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How Automated Riveting Saves Time

Work Operation	Conventional Method (hr.)	Automatic Method (hr.)
Loading drill parts into feeder	0.20	0.20
Riveting into 200 holes	1.20	0.07
Riveting into 200 holes	0.50	0.15
Riveting into 200 holes	1.15	0.62
Cleaning	2.00	1.00
Total	4.00 hr.	2.47 hr.*

* Correct estimate that installation, operational shifts and lubrication techniques will further improve this fabrication time at least 25%.

test is used as a parameter gauge.

Following acceptance, the parts are set on racks, just beyond the transfer gate, which are used as the test stock area for final assembly operations. Carriage with their empty fixtures are rolled onto the second transfer gate and stored to the opposite track. Here the second test then picks out the fixture, returning it to its original stop spot and takes another fixture and around the track for a second work cycle.

Four adjustable transfer stands are located opposite the track at every end and are used primarily for assembling undetectable for automatic fastening, but may also be used as a sort of emergency fix. Hooks stop each auto fixture and quickly remove fixtures and carriage of necessary.

► **Fixture.** Used-Fixture frame-type. Fixture structure was selected because of its versatility, economy of construction, wide adaptability and ease of construction from basic design sketches. Good mobility was obtained by mounting the transfer parts on carriage and weight reduced by using aluminum casting. Aluminum construction was selected due to ease of use in stock, reducing price by 75%.

► **Change and Location.** Change the parts first obtaining proper change and location via "a permanent problem," and a similar error failed to develop a standard purchasable item that would be economical, sturdy and accurate while adaptable.

Stewk Tool Co., Detroit, said Con- veyer to supply requirements and want to work using their specifications as a base.

► **Complete the clamp and locator** as one unit, maximizing obstruction and providing positive assembly.

► **Movement** the unit through the fixture frame structure, surface into top or below, providing greater machine throat clearance, better rigidity and economy.

► **Block and locator unit** should be adjustable to correspond to design of the work.

The Stewk clamp meets these requirements and its initial cost is com-

parable to conventional products. But durability and maintainability makes it extremely cost less, Conveyer says.

When a web with telescopic adjustment is being built, a carriage or plates is suspended inside the fixture frame on carriages. Carriage is the base plate provide a setting type location for detail parts. Pilot holes and guide holes are cut through the template for locating the rivets.

Rivets successfully in the machine are drilled by hand and adjustment. ► **Work Carriage Design.** To move fixture and parts conveniently and economically, the work and positioning carriages, which are mounted on the vertical tracks, are of cantilever design, providing maximum weight plus clearance of carriage and work through the machine's throat, increasing and lateral positioning travel, height adjustability, large flexibility and maintenance economy.

THRUST & DRAG

We still know comparatively little about the ways to get out of an airplane about to crash in. And this question from an R&D pilot who just managed to escape from a Cessna brawler is a high-speed question.

"I was unable to release the control columns from between my legs owing to the transducer G force" (Richard Gattis, the control column has to be released, which requires hand actions downward and down turned downward).

"In the end I knew I couldn't get my head down, but I let my hand up and it was launched back against the handle which was the only mechanism I was ejected through the canopy. I was ejected through the air and then carrying out the drill of separation, which from the seat. The only other memory I have was after my jaws clamped opened. It was quite a short fall."

-DAA



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First used in 1952 for windows of the Douglas DC-6, PLEXIGLAS 55 was first specified for cockpit canopies of the Boeing B-47, shown above. Today this improved grade of acrylic is standard transparent plastic in being used on more and more types of military and commercial planes. Current production aircraft using PLEXIGLAS 55 include:

Beech B-47	Douglas DC-7, DC-48, DC-6
Cessna T-37	Lockheed F-104
Convair F-102	Martin B-57D
Douglas A-10	North American F-100

PLEXIGLAS 55 is characterized by notably improved resistance and a higher maximum useful service temperature. Combined with

the traditional clarity, flexibility and weathering properties of PLEXIGLAS acrylic plastic, these advantages provide significantly longer service life for transparent enclosures on current production aircraft. For the planes of the future, we are working to raise the quality of transparent plastic to an even higher level.

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all other oils, fuels and propellants, too!

These Fluoroflex-T long-life hose assemblies represent a new concept in aircraft plumbing—permanent lines, no matter what the fluid conveyed. Suffering no change in flexibility even down to -100°F, or after extended high temperature service, they also withstand vibration. . . take up

shock loads without any loss of flexibility or strength.

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Fluoroflex-T hose assemblies are made of a special fluoropolymer which is immune to all known fuels, oils, and propellants. They are also immune to all known acids, alkalis, and solvents.



RESISTOFLEX hose assemblies are made of a special fluoropolymer which is immune to all known fuels, oils, and propellants. They are also immune to all known acids, alkalis, and solvents.

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IAS Summaries

The following columns continue AVIATION WEEK's publication of summaries of papers presented at the recent 23rd annual meeting of the Institute of the Aeronautical Sciences.

Approximately 80 papers were presented during the four-day meeting.

Last year's installment included summaries of 31 papers on Aerodynamic Aspects, Structures, Stability and Control, and Aeroelasticity.

This year will be continued in our coming weeks, with all summaries again available to AVIATION WEEK by the IAS have been posted.

Aeroelasticity

►The Divergence of Supersonic Wings Including Chordwise Bending—Morton A. Biot, Consultant, General Army Lab., Inc.

The static aeroelastic stability in divergence problem is investigated for thin supersonic wings when not only the spanwise bending and twist is taken into account, but also the chordwise bending. The problem is treated in a systematic manner of increasing complexity from the two dimensional loading up to the loading edge to the three dimensional stability of the nonlinear wing.

Several methods of approach are developed including the nonlinear aspects of the problem and the asymptotic behavior indicates a strong dependence of stability on Fanning's ratio and the shape of the deformation.

►The Dynamic Response of a Large Airplane to Continuous Random Atmospheric Disturbances—Franklin W. Doolittle, Head, Dynamic Loads Analysis Sect., Langley Aeronaut. Lab., NASA.

The problem of stresses in turbulent or a flexible airplane which is in flight has been the subject of many investigations. The problem has been to take into account the effects of atmospheric disturbances on the airplane. The results of these investigations indicate that the magnitude of the stress of random wind loads tends to decrease the magnitude of the stresses but may increase the magnitude of the stresses significantly.

►The Design and Testing of Supersonic Flatter Models—John E. McCulloch, Jr., Jr. Langley Aeronaut. Lab., and Robert E. Hoffman, Asst. Prof., Army, Engng. M2.

The basic problems of flutter testing in the low supersonic speed range (Mach number 1.2-2.0) are indicated. The requirements for models which simulate flexible airplanes when such models are subjected to a pressure in the wind tunnel, and are compared with those when velocity is added so that flutter occurs in the case of a low speed wind tunnel.

A particular type of construction for supersonic flatter models is described in detail. Methods of vibration testing, static testing and flutter testing are discussed. Particular emphasis is placed on the test

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scope of varying flow parameters rather than could parameter to prescribe future. The test for varying flow parameter is the variable Mach number experiment but within of the MIT laboratory conditions where aerodynamic features are presented.

► An Approach to the Flutter Problem in Real Fluids—Dr. Rolf, Assoc. Prof., Aero. Engrg., Grad. School of Aero. Engrg., Cornell Univ., and M. E. T. George, Army Research Engr., San, Mexico Div., Douglas Aircraft Company, Inc.

It is well known that ideal fluid theory does not adequately describe the behavior of an airfoil in steady flow even before the stall is reached. Satisfactory results have been obtained in steady flow theory, however, by directly relating the Kutta condition, such that the lift curve slope is adjusted to an empirical value.

Present work is an extension of this idea to unsteady flow problems. The procedure is made possible, on the foundation of this earlier theory, by interpreting the empirical lift curve slope as a relationship between the airfoil's aerodynamic characteristics at the leading and trailing edges. It is postulated that this relationship holds also for unsteady flow. A physical interpretation of this statement is given, and a further generalization is suggested by introducing a time lag into the relationship, this gives a further empirical variable, which may be adjusted to the experimental results.

A further theory is obtained which may be used to calculate the time lag of an airfoil in steady flow, but with the Kutta condition relaxed to obtain deviations due to viscous effects. Further coefficients are calculated, and the possibility of an empirical deviation factor is fully discussed.

Although the theory is not considered to be valid for two large deviations from the empirical lift curve slope, i.e., for stall behavior, the discussion is extended into this domain. It is suggested that present theory may be a first step towards an improved theory of stall behavior.

Aerodynamics

► An Approximate Method of Calculating Three-Dimensional Compressible Flow in Axial Turbomachines—L. A. Cowley, Chief G. Helicopter, USAF, for Army Corps of Flight Test Div., and W. Duncan Rennie, Assoc. Prof., Mechanical Engrg., Dept. GATE

The two principal existing methods of calculating steady compressible flow in turbomachines are:

- (1) A simplified one-dimensional analysis
- (2) Numerical methods using the complete three-dimensional flow equations

The first is not satisfactory for subsonic turbulent flow with appreciable swirl development, the second is very tedious and time-consuming.

The purpose of this investigation is to extend the approximate methods, especially with an existing compressible flow in compressors with constant blade height, to the analysis of compressible flow in turbomachines with variable blade height. Assuming that the blades can be completely described by the exit flow angle, and neglecting the influence of downstream blades, the analysis is made considering the flow be-

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The regulator is attached to the pilot's standard oxygen mask. Resulting in a 100% saving of valuable panel space. The regulator itself weighs only 1½ ounces as compared to 1½ pounds of the standard regulator. A small 1½ inch mask-however the regulator, bulky breathing tube. These are only a part of the advantages of the new Scott-Purcell miniature Oxygen Regulator system available for military and commercial use.

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Better service for users of forgings

Kaiser Aluminum's recently acquired Elm Forge plant—one of the nation's three major aluminum forging plants—is now providing industry with a contracting supply of high quality aluminum forgings, plus nationwide service.

The Elm plant can produce aluminum die forgings from the smallest size up to 150 pounds as well as hand forgings up to 700 pounds, and has a rated capacity of 12 to 25 million pounds per year.

For years, Kaiser Aluminum has been a major supplier of aluminum in many forms. The acquisition of the Elm plant makes it possible for us to bring important benefits to users of forgings.

Sales service.—The addition of aluminum forgings to our wide range of cast products enables our nationwide sales force to see more of our customers. Personal attention is given to every order from the time it is received until the forging is delivered to the customer.

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Quality control.—Trained laboratory technicians, using the most modern testing methods and equipment, assure highest quality forgings to meet your specifications.

Production control.—The most modern methods of production control are employed to expedite material flow, die making, forging and finishing operations, thus increasing efficiency of shipping schedules.

due to the pilot was obtained by normal measurements of the cockpit attitude. The control losses felt by the pilot were independent of the instantaneous hinge moments, and they may could be studied through wide limits. Adjustment of the stability and control from characteristics of these aircraft could be made easily during flight.

These analyses have proven to be particularly useful for investigating the effects of changes of aircraft stability and control characteristics on handling qualities. The results of this research form a basis for recommendations to handling quality requirements, as well as providing flight evaluation of aircraft configurations in all areas of their use in new aircraft. Further considered in the design of the research equipment, flight techniques, and control results are discussed.

Aircraft Design

►The Feasibility Program of the Air Force—Ohio 10 Miles, Extension of Laboratory, Wright Air Development Center. The first task was to determine the feasibility of Air Force program has been fully successful with the growing complexity of Air Force aircraft.

It has become almost common belief that the growing complexity can only be overcome by the introduction of larger design, new materials, special production equipment, and specialized techniques. The program has tested the aircraft industry and its supporting industries to an extent which emphasizes the feasibility of a pilot plan.

This paper explains the Feasibility Program which is designed to identify the structural problems that are the design part which the preliminary design program will have in the implementation of the program.

►Aircraft Design and Mission Capability—Hofmann, H. G. Gieseler, Technical Director, Aerobics and Computer Dept., U. S. Naval Air Development Center.

The complexity of the aircraft system design characteristics and the manner in which they are accomplished is perhaps the most important problem that has to be resolved before a successful development program can be undertaken. While this is a true for both commercial and military aircraft, it is particularly true of the military aircraft since its operational environment is much more complicated due to the presence of the enemy and the selection of weapons and strategy.

This paper presents an analysis of a hypothetical and simplified system and a box which the major factors and over 100 effectiveness of a military or transportation system are considered. Such consideration as the type of mission, the use and speed of the aircraft and thus influence on the load and cargo capabilities, as well as the compatibility in various other areas as well. Also included are the effects of the flight plan variation and the use of commandments on mission accomplishment.

The primary purpose of this paper is to illustrate how the use of practical operations analysis techniques can be used to solve seemingly complicated problems in a rather simple fashion and to demonstrate

the strong effect of large numbers of aircraft and the consequent reduction in aircraft loss.

Meteorology

►The Correlation with the American Meteorological Society.

►The Low-Level Jet Phenomenon—A. E. Blandford, Visiting Prof., Dept. of Meteorology, University of Texas.

The low-level jet is used to denote the strong effect of the wind profile which exists during an elevation of 1,000 to 4,000 feet above the ground. It is best developed at night, and the wind speed maximum, usually occurs at the top of the nocturnal inversion.

When the nocturnal inversion is caused by the depletion of a surface inversion, the jet is more or less continuous. When the nocturnal inversion is caused by the formation of a surface inversion, the jet is more or less continuous. When the nocturnal inversion is caused by the formation of a surface inversion, the jet is more or less continuous.

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►Some Aerodynamic Measurements of Aircraft Engines—Lester Martin, Chief, Special Projects Unit, Scientific Service Div., U. S. Weather Bureau.

Aerodynamic measurements of aircraft engines are being made in the wind tunnel and in the field. The measurements are being made in the wind tunnel and in the field. The measurements are being made in the wind tunnel and in the field.

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Pick-A-Back Copter Starts Tests

Research project aimed at increasing the range of a rescue helicopter by using it as a pickup or transport is being conducted by the Air Research and Development Command by Theodor Aircraft Co., Bethesda, Md.

A model of the prototype aircraft, fixed to the top of a Fairchild C-119, is undergoing wind-tunnel tests at Wright Air Development Center, Dayton, Ohio. Partly because of growing USAF and Army interest in the concept, the project is being carried out. The project is being carried out.

USAF's initial effort to extend the

copter stage took place several years ago with experiments in towing. The project was feasible, and pilots with glider experience proved most adept at the task. They were able to handle low-level rescue. However, pilot fatigue became an important factor in long missions and the program was dropped.

The first pick-a-back project, project was launched in 1951, when the contract was awarded to study the probability of lifting a Sikorsky HO4S (S-1) helicopter on top of a C-119. Lacking mechanisms on top of the airplane would be used to assist the copter's landing gear.

Capacity weight is given as 5,500 lb.



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The South Wind Model 942-A heat exchanger was chosen for the Hamilton Standard air cycle cooling package in North American's famous F-86H Sabre Jet! This heat exchanger, which is for the transfer of heat from air-to-air, employs the plate and fin type of design. However, it is but one of many different models currently being produced by South Wind, each with different design features.

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High pressure, high temperature heat transfer in aircraft is achieved effectively with South Wind's lightweight, flowwell heat exchangers. Either the tube bundle or plate and fin type of design is incorporated in exchangers with a variety of configurations to meet specifications for transferring heat from air-to-air, liquid to liquid or liquid to heat.

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South Wind Model 942-A



South Wind

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PRODUCTION BRIEFING

► New entry in aircraft canopy and wind defield will be General Aviation & Hui Corp., New York, which claims an export 1-ton in an advanced development stage of a high-strength, scratch resistant plastic-type material that it has trademarked Gafite.

► Koehler Aircraft Products Co., Detroit, has been purchased by New Britain Machine Co., New Britain, Conn., and will be operated as a subsidiary.

► Aerophysics Development Corp., Los Angeles, active in guided missile projects, has been acquired by Shockburn Perkin Corp., South Bend, Ind. To be operated as a subsidiary, Aerophysics will be headed by its founder Dr. W.J. Ben Bell.

► Lees, Inc., Santa Monica, Calif., has appointed Avco Aero-Metal Division, Troy, its French distributor and service agency for helicopters, new designs, propellers, turbo compressors and emergency equipment, piston pumps and certain other aviation products. Division is a top French fighter plane producer.

► Alcon Instruments, Inc., division of Eastern Electric Sales Industries Corp., has moved its plant to 595 Madison Ave., New York 22.

► Explorer Corporation reached new record of Boeing Airplane Co. last year. Awards of \$12,180 were made on 2,551 suggestions period from 11,412 when in 1971 Boeing closed its 1971 suggestion book. 3,496 ideas for total awards of \$195,173.

► Southern Automotive Co., Dallas, plans to move into new quarters to replace those that will be moved when the city puts up a new terminal to SAC's parent unit. Engine overhaul plant will not be affected by the reorganization. SAC, since its 1974 sales totaled about \$5.5 million. Its gasoline sales topped the 1 million gal mark for the second consecutive year.

► W. S. Shandus & Co., Dallas City, Calif., has been appointed distributor of Triflex coated glass fibers made by du Pont for aircraft, electrical and other purposes.

► International Business Machines Corp. plans to occupy at the end of the year two new buildings under construction at Poughkeepsie, N.Y., where engineering and development will be handled in electronic data processing equipment. Some 140 IBM personnel will work in the new \$6,000-ft facility.

INSIDE STORY

Austenal Quality Control



The same technique used in the investment casting of lightweight original and direct applications in two machineable sections is put to work for modern industry in Austenal's unique Microcast process. Complex precision parts such as turbine blades and vanes or the wheels pictured above by X-Ray are cast directly, eliminating early sanding and holding finishing in a furnace.

From the initial mold to the finished casting, Austenal's skilled technicians check for correctness of detail and dimensional accuracy. Then, the completed part is subjected to X-Ray and X-Ray examination to search out any internal structural flaws and assure that each part released by Austenal will deliver according to the highest performance standards.

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Navy Jam Blamed On Engine Delays

Failures in the production of jet engines were "the most important single factor" hindering the Navy's plane program during the past Korean buildup, Navy Secretary Charles Thomas testified in a closed session before the House Armed Services Investigating Subcommittee.

Now this \$1 billion in order for approximately 1,000 planes "which could save millions to specifications and even out there originally intended manner" have been cancelled, he reported. The termination cost to the government is \$227 million.

Closed Session—The subcommittee, headed by Rep. Edward Albert, started its investigation after Thomas told a hearing session he was "embarrassed" about the Navy's plane program (AVIATION WEEK Feb. 7, p. 15).

He pointed to the sharp drop in Navy's request for new procurement money—from \$1.9 billion for fiscal 1955 to \$753 million for fiscal 1956. He blamed contract cancellations and production delays. Thomas indicated, however, that by fiscal 1957 there would be a sharp upswing in the amount of Navy's requirements for plane procurements.

At the Navy Secretary's request, his explanation of the reasons for Navy's lagging program were presented in closed session. Thomas released only a general statement.

The subcommittee, however, wants the full testimony publicly released, and has requested Thomas to review it and make deletions pointed out as security grounds.

Materials—Strong that past problems have now largely been solved and that the Naval air procurement program is moving forward effectively, Thomas noted.

In June 1952, two years after the Korean outbreak, orders were placed for new Navy planes at a rate "about three times as fast as the rate of deliveries of new aircraft immediately prior to Korea. These orders included substantial increases in power and successful models of jet and high performance types which because the maturity of operations due to the latter part of the Korean war."

But the procurement at this time, he added, "also included substantial production orders for quantities of new aircraft which had been in the design stage only but which were badly needed for the fleet."

These experimental planes were scheduled for production when the responsible research companies state that in their judgment the models were ready for production. It was considered at that time that these production pro-

grams were acceptable in probable rate even though development was incomplete and full engine and demonstration tests had not been made.

Too Optimistic—"Fleet squadrons operating in the Korean theater were seriously short of attack-type aircraft," Thomas said. "In fact, losses of this type in some months of 1952 were greater than new deliveries from the factories. It therefore became necessary to substitute the obsolete World War II Corsair fighter for the mission. Under such circumstances aircraft were ordered into quantity production, and in some cases all systems of the airplane had not been proven."

Factors of the time required to complete the development of engine, component equipment, and aircraft was too optimistic, both by the designers and producers and by the Navy," Thomas declared. "Evidently the most important single factor was the manufacturing performance and the resulting delays in delivery of new jet engines."



Muffler Doors Used in 'Project Hush'

A 1945 noise reduction at Navy's Aircraft, Inc.'s engine shop was here achieved by installing dust jacket mufflers with soundproof doors. Endusers are made of steel covered with padding which is coated with porous cloth. No top

U. S. Group Urges Jap Plane Orders

By Dan Korman
(McClure Mill World News)

Tokyo—The American Far East Council has recommended to the Defense Department that the United States help finance a project providing for assembly of 170 U. S. jet aircraft in Japan within 18 months.

Under the proposed program, 70 North American F-86 Sabres and 100 Lockheed T-33 jet trainers would be assembled in Japanese plants at a ship toward building up Japan's air defense. \$37 million (plus Japanese government in-kind loan, formerly on the plan but not wanted to accept it unless the U. S. finances entirely, the entire project American officials on the other hand, say Japan must bear a substantial part of the cost.

The tentative U. S. proposal calls

J-M Clipper Seals Fly with the Sikorsky HO5S helicopter...



Clipper Seal being installed in the supercharger gear box of the Sikorsky HO5S helicopter to seal oil in, keep abrasives out.



Photograph and cross section of Type LFD Clipper Seal. This is not one of numerous seals available to solve tough sealing problems.

... seal oil in, keep abrasives out, at critical locations

To retain the lubricants vital to its complex rotor and gear systems ... and to protect bearings against the infiltration of abrasives ... the new Sikorsky HO5S helicopter depends on these positive sealing qualities of Johns-Manville Clipper Seals.

Clipper Seals are flexible—molded of special compounds, they have a tough, dense heel and a soft flexible lip concentrically molded into one piece.

Clipper Seals reduce friction—A specially designed garter spring holds the lip as tight but firm contact with the shaft. Thus a positive seal is always maintained but shaft wear is reduced and over-heating is prevented.

Clipper Seals are corrosion-resistant—The molded body is usually non-metallic, is therefore unaffected by electrolysis and most forms of corrosion. And the garter spring is available in various corrosion-resistant metals.

Clipper Seals are versatile—They can be furnished in flange sections of varying widths to fit practically any cavity. Various lip designs are available ... and various lip compounds provide the proper hardness for superseals from -65° to +450°.

To find out more about Clipper Seals and their application to your particular sealing problems, write Johns-Manville, Box 60, N. Y. 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.



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You know that United Air Lines Air Freight is fast—but do you know how *dependable* it is? Here's what the traffic manager of Time Magazine says about United Air Freight: "Six shipments on United from Chicago to New York worked out exactly as planned. One shipment began 10 minutes faster than our very best and cheapest calculations. Those ten minutes are of considerable value to us."

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for a total budget of about \$17 million in 1955, of which the U. S. would pay only \$16 million—\$28 million for the tubes and \$5 million for the jet turbines. This would pay for equipment and parts.

The Japanese would put up \$12 million for the F-4s and \$9 million for the T-33s, covering the costs of maintenance, management, some equipment, training and living space.

► **U. S. Counterpart Funds**—The American contribution would include \$10 million of \$50 million in counterpart funds arriving from the sale of wheat to Japan. That one-fifth of the fund already has been designated as an outright U. S. grant.

The \$24-million balance to be sent by the U. S. with other three counterpart fund grants might be pooled under the Mutual Security Administration.

The Japanese would like to use the entire \$40 million left over from the wheat counterpart fund, now earmarked to purchase commodities, to finance the jet assembly plant. But Americans officially oppose this suggestion.

► **Debate**—The question of whether the Japanese budget will cover the expenses that Americans must be borne by Japan probably will come up for debate in the Diet later this month.

The government defense bond, despite its device for greater U. S. assistance, is expected to ask for a special ceiling for the jet project in addition to the scheduled \$264-million defense budget for this year.

The Diet also would have to grant the government contractual authority to contract funds in advance to cover the following year.

► **Builder's Promise**—Paving toward acceptance of the project are the residential Shin Mitsubishi Co. and Kawasaki Aircraft Co., which would assemble the F-4s and T-33s respectively.

It is doubtful, however, that public treasury approval would be granted before May 1, target starting date for the program under the American proposal.

If it does not get underway on approximately that date, the U. S. may find it necessary to cancel the whole project. A Defense Department spokesman promises that any funds budgeted for the current year must be spent by June 30, 1957. By this time, U. S. officials calculate, 170 jet planes can be assembled in Japan. If the production period were extended, less planes could be assembled, resulting in prohibitive costs.

► **Low-Cost Production**—One of the advantages of assembling U. S. jets in Japan, the American representatives emphasize, is the fact that the job can be done at substantially less expense in Japan than in the U. S.



High Mechanical Control Test Machine checks the operation of the fuel and engine fuel controls with them in flight-like and overpressure at 100 psi in seconds, speed, time and.

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FLINT/RRR—Vought production plant near Clinton produces a full-line of different types of military and civil planes including Vought fighters and light transports. Vought fighters (left background) and Beech and Stearman light transports (foreground).

De Havilland At Work



DETROIT/DHMB—Gloster and Gloster components are shown being modified in this plant, responsible for tailgates, radial motors and piston powerplants.



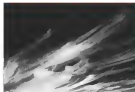
LANCASTER/DHMB—Propeller design team not more than a dozen people. Photo shows large propeller for steel propeller for B-24 and B-29 bombers.



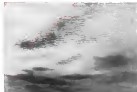
LANCASTER/DHMB—Wings for the day and night fighters and civil Voughts are among components built here. Design, development, engineering are done at King Lane and Hestonfield.

FLY SAFELY

These weather items prepared in consultation with the United States Weather Bureau



CIRRUS—Long, dense, wispy clouds (shown) identify the strong shearing winds of the recently discovered jet stream. Generally, blowing from NW—means continued low weather. Spreading from SW—possible rain.



ALTO-CUMULUS—Use the red streamers of such clouds to determine wind direction and speed. Wind blows across the tops of the clouds in the reds. Expect light to moderate rain when flying near these clouds.



STRATO-CUMULUS—Look for smooth flying above the first cloud deck. The top surface marks an inversion where temperature remains with altitude. Be careful of icing when descending through the deck in winter months.



CUMULO-NIMBUS—The thunderstorm cloud, instantly called a "CB." Watch for rapid line development when "CB's" begin to line up northeast—and direct in line ahead. Such danger usually increases by midnight.

Best Pair to Get You There

Just as a pilot knows the weather, it pays to know the product that goes into your plane. That's why it's smart to fly with famous Flying Red Horse aviation products. They have the approval of every major aircraft builder... surpass the rigid specifications of the Army and Navy... have been the choice of every leading air pioneer since the Wright Brothers.

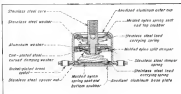
Fly further... smoother... safer with the Flying Red Horse!



MOBIL OIL CO., INC. and MOBIL OIL CO. INC. GENERAL PETROLEUM CO. GENERAL PETROLEUM CO.



NEW BASTY MOUNT, shown in various, shock-vibration mode and at vibration regardless of mounting angle.



Isolator Damps Vibration at Any Angle

By Philip Klein

A new isolation mount, which not only gives very low amplification of existing vibrations, but can be mounted at any angle, including horizontal, or completely inverted, has already been installed in last Coast aircraft carrier where it's being processed this month.

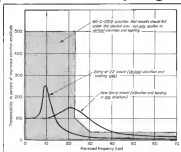
Developed by Barr Controls, Inc., formerly the Basty Corp., the new mount is specifically designed for conditions encountered in aircraft and jet aircraft. The reason behind the new mount will do much to improve aircraft equipment reliability.

The new mount generally meets or exceeds the requirements of MIL-C-172R, except for natural frequency which runs higher than specified, but with good reason, according to Barr. ■ **Two Big Advantages**—Here are two of the device's biggest advantages:

• **Low transmissibility** at resonance provided by higher natural frequency and heavy damping, means that seismic response will not be subjected to more than 100% of the source or aircraft vibration under worst conditions. This compares with 500% amplification permitted under MIL-C-172R.

• **Wide-angle loading**, resulting from novel internal construction, enables the mount and its equipment to be installed in any convenient position, including horizontal mounting. This is an important advantage in missiles and jets, where flight stresses range up to several g's.

• **Disinfection** With the GMS-It is an asset that most missile and avionics engineers have been disturbed with the performance of older types of isolation mounts for use in missiles and jet aircraft.



LOW TRANSMISSIBILITY of new mount gives low amplification of vibrations in air problem then permitted by MIL-C-172R or obtained from old mount for vertical loading.

A small horde of letters on the subject was triggered when Avionics Week reported a statement by Floyd A. Paul, that last mounting was possible to isolate mounting for missiles. Paul, at the time with Cal Tech's Jet Propulsion Lab, made the room available at the 1973 Electronic Components Symposium (Avionics Week, Jan 15, 1973, p. 21).

Some of the letters came from missile contractors' engineers, calling for new equipment mounts. Other letters, from missile mount manufacturers, explained that they were largely victims

of outdated specifications. These specs, originally prepared in the early post-war period, were designed to handle conditions encountered in the slower piston-engine aircraft such as the B-36.

■ **Restless Needs**—For instance, W. A. Korich, vice president of Robinson Avionics (a major isolation mount manufacturer), called for "revision of obsolete or unrealistic specifications..." and want of the need for "higher resonant frequencies" (Avionics Week, Aug 30, 1974, p. 47).

Is another letter, Raymond G. Yac

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NEW SERVICE STARTS—Ribbons of five airlines—United, Western, Pan American, American and TWA—cut a ribbon to open Los Angeles Airways' first helicopter

passenger route after eight years of scheduled mail operations. First passenger service is between Long Beach and Los Angeles International Airport, with Sikorsky S-55s.

AROUND THE WORLD WITH SIKORSKY HELICOPTERS



RCMP SIKORSKYS—First all-helicopter squadron in the Royal Canadian Air Force is now in operation with rugged Sikorsky S-55s. These workhorses proved transport helicopters are now based at Baguville, Quebec. Here are four of ten S-55s in the initial Canadian order. All were flown to Canada from Sikorsky's plant.



BRITISH USE S-55s—Helicopter passenger service between London Airport and Westbury is scheduled to begin this spring. British European Airways will use S-55s for the flights, which take 18 minutes each way compared to more than an hour by surface travel. BEA planned helicopter passenger flights in 1950 with S-55s.



America's First Truly Successful Helicopter —Sikorsky VS-300



MAY 30, 1940—First public view of Sikorsky's historic VS-300—America's first truly successful helicopter—came May 30, 1940 as Igor Sikorsky was awarded Helicopter Pilot License No. 1. The VS-300 was only the first of many Sikorsky achievements in advancing helicopter development and industry-leading production efficiency.



SIKORSKY AIRCRAFT

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One of the Divisions of United Aircraft Corporation

Truscon builds this "Door



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within a Door" to help you service the biggest ships

Giant Truscon Steel Hangar Doors Close Snugly Around Fuselages

In these double casement monorail-type hangars, pairs of giant Truscon Straight Slide Doors close snugly around fuselages of the big ships. Custom door sections and ingenious sealing device allow efficient maintenance work in any weather, with the full assembly inside the hangar. Custom door sections can be designed to fit any type or size fuselage. Foam-rubber insert allows for bulge variations. Twin sliding panels close when no fuselage is in the opening.

This "door within a door" provides a snug seal without damage to fuselage or full assembly. Straight Slide Doors can be 35 to 40 feet wide, and 65 feet or more high. Fully open, a clear space 550 to 650 feet and more, in width, is possible.

Truscon makes hangar doors to fit every need, every size opening. All are products of nearly thirty years' specialized experience in big-door design and construction. Send coupon for details and specifications describing Truscon Straight Slide Steel Hangar Doors and other major types.



SHIELDING SHIP WATER-TIGHT when Republic Truscon Bridge Products are on the job. Note: Truscon Steel Sectional Plate Arch-Rise is being installed at Cleveland Lakeland Airport. Truscon is an alloy steel. Design and analysis can help it hold out better than any known material in its price class. Send coupon for copies of your nearest Truscon Steel Company's brochures.

REPAIRING ALLOY STEEL CRACKS
FOR THE MARINE The door, showing bearing and a number of alloy steel bolts, like this help contain the impact on the big ships under stress. At 300 mph plus, there's a great deal of strain that end parts need to stay safety with shear weight. Republic's world's largest producer of alloy and carbon steels will help you apply these "fighting metals with safety first" to help you get the right steel in the right place.



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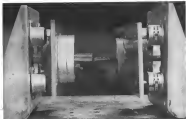
☐ Truscon Steel Columns ☐ Truscon Reinforcing Products

Name _____ Title _____

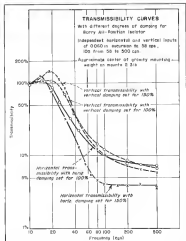
Firm _____

Address _____

City _____ State _____ Zip _____



SHAKE TABLE shows relative effects on horizontally mounted sections (over one, right).



EFFECT OF CHANGES in damping on transmissibility of new mount is shown above.

901, static vibration test engineers at
Bell Aircraft Corp., said that "The ad-
vance of the guided missile and the
rocket-powered aircraft has forced
changes in the concepts of vibrator de-
signs." (AVIATION WEEK Oct. 25, 1954,
p. 57)

Targets called for redesign of present
low-frequency mounts so that they have
a transmissibility of no more than 100%
at resonance and so that they are op-
erative under the following conditions:

- Steady state flight accelerations of
1G or more in all three planes.
- Flight attitudes at all angles up to
and including complete inversion.
- Peak temperatures up to 350°.
- Highly oxidizing atmosphere created
by rocket propellants.

The new Berry mount appears to
meet or exceed the requirements of the
Targets cited.

► **Break With the Past**—Berry's decision
to depart from the MIL spec require-
ment that mounts have a natural fre-
quency lower than 15 cps, was made fol-
lowing discussions with more aircraft
and missile manufacturers, which con-
firmed its own analysis of what was
needed. Berry learned that one missile
maker had resorted to shipboard-type
mounts (with 30-cps frequency) with
excellent field results.

Several airborne companies, after an-
alysis of the vibration and shock prob-
lems encountered in their jet aircraft,
were calling for 20-30 cps mounts,
Berry found.

► **The Result**—The result of this study,
and subsequent design efforts, produced
a new solution mount in which the
vertical load-carrying member is sup-
ported by two coiled springs cushion-
ing its total load (see sketch and photo,
p. 74).

As the load member moves vertically,
it carries with it a large nylon washer
which rubs against the metal shell to
provide friction, damping. A guide
groove in the nylon damper maintains
constant pressure against the metal shell
and compensates for any wear resulting
from use.

The same two coiled springs serve
to cushion lateral vibration of the load-
carrying member, with steel washers
sliding across the surface of the nylon
damper to provide lateral damping ac-
tion.

A welded nylon plate on the bottom
of the shell, and a nylon washer at
the top, serve as cushions to prevent metal-to-metal contact when the vibrator has
force under stress shock. This reduces
the shock effects transmitted on to the
equipment.

► **Adverse Operating Conditions**—Al-
though Berry has not yet established a
firm operating temperature range for
its new mounts, pending further tests,
it says they can be used over the MIL-



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AIRPOWER in the AGE OF PERIL

22nd Annual Aviation Week

MARCH 14, 1955

"Inventory of Airpower" Edition

will cover vital aviation subjects on global scale

AVIATION WEEK'S 22nd ANNUAL "INVENTORY OF AIRPOWER" EDITION—"Airpower in the Age of Peril"—covering every phase of U.S. civil and military aviation, and providing the latest information on foreign airpower, will be published March 14, 1955. Featuring the complete story of the transition from the Korean crisis buildup to the solid industrial and airpower base necessary to meet the requirements of U.S. Policy over the long pull, this important issue will hold significant and lasting interest throughout the aviation world.

Aviation management men, engineers, military and government officials will read, refer to and depend upon "Airpower in the Age of Peril." Only in this edition will be found full information on fiscal 1956 federal aviation budgets, new procurement and financing regulations . . . ground rules that will guide Air Force and Navy policy in doing business with the aviation industry over the next two years, as well as latest reports from AVIATION WEEK correspondents in every part of the world on significant developments abroad.

Reference tables especially designed for "Airpower in the Age of Peril" will give new, revised specifications on U.S. and foreign aircraft, missiles, and engines. Special reports will cover the expansion of the guided missile industry, the conversion of do-

mestic and international airlines from piston to gas turbine powered equipment (including full statistical coverage of all U.S. and foreign airline operations), the expanding role of equipment and component manufacturers in the weapons system development and production cycle, and avionics in military and civil aviation. This storehouse of vitally needed aviation information will be used constantly whenever aviation business is transacted.

This extremely great usefulness to the aviation industry gives "Airpower in the Age of Peril" prime importance as an advertising medium. Aviation companies and their suppliers will find the long-lasting selling power of this significant AVIATION WEEK issue unmatched in aviation publishing today.



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For Turbo Propellers (jet)
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S-60

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CP-100

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Model Air Research Engines



CP-100

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W-15

For Turbo Propellers (jet)
Model Air Research Engines



W-15

For Turbo Propellers (jet)
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For Turbo Propellers (jet)
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For Turbo Propellers (jet)
Model Air Research Engines

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Shown here—Control of the Gulf Stream Express

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C 172B steps of -55C to 55C without adverse effect on performance.

The company believes the present record endurance may be made up to 150C, and by substituting Kel-F for nylon, it hopes to raise the top temperature to 200C. The use of Kel-F also will enable the device to withstand corrosive fumes from rocket engines, Barry believes.

Company tests to date indicate that soaking the isolator in oil and water has no noticeable effect on performance, Barry says.

► Wide Range Characteristics—By varying certain parameters, such as spring constants, the isolator can be given a wide range of natural frequencies (15 to 30 cps or higher) and damping. It is possible, for instance, to give the isolator a minimum transmissibility as low as 100% at resonance. However, standard models will have 150%.

By compensating on a slightly higher (170%) transmissibility at resonance, instead of using sufficient damping to obtain 100%, the isolator gives better isolation (lower transmissibility) at higher frequencies above resonance. In-topping feature of the isolator design is that horizontal and vertical transmissibilities can be set independently of one another.

A comparison of isolator efficiency specified in MIL-C 172B and those obtained with the new Barry model, is shown on page 54.

► Load Range—Because of the non-linear characteristics of it is a little more difficult to define the load range of each case and model of isolator.

The current model in the middle of its range of travel so that there is no physical limit on the maximum load which can be handled. However, the



Powerful Midget

Eight-ounce linear isolator, half as heavy as its predecessor, has been developed by Arkonach Manufacturing Co. The 1.60 lb. isolator, constructed built-in, with mini-films, linear isolator, and magnetic brake delivers up to 150 lb. force, can withstand static load of 500 lb. or more in compression.



► Demands for more precise flow measurement in aeronautical research have brought about the adoption of the Potter Flow Meter throughout the aviation industry. Vents, pits, propellers and other fluids are being measured with $\pm .5\%$ accuracy in laboratory experimentation and in actual prototype flight testing with light, compact Potter Flow Meters.

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Performance records on all types of planes prove Klixon Breakers are outstanding for dependability.

They withstand shocks and vibrations for as much as the rotor assembly (overstressed). They are properly calibrated and individually tested for shunt trip and 200% load tripping characteristics in various dependable procedures. Write for data giving complete details.

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had will determine the rotor's natural frequency—the higher the load the higher the frequency. Hence the desired natural frequency now determines the practical limit on vibration load for any individual application.

The maximum load will depend upon the natural frequency desired as well as upon how close to the vibration the aircraft can be loaded under static conditions and still have sufficient level to accommodate the vibration which will be encountered. The latter consideration is the more critical of the two.

► WADC Gets a Look—Barely recently demonstrated its new all-purpose mount to engineers from several Wright Air Development Center laboratories. The engineers had conducted a similar demonstration several months earlier for a few select inside manufacturers.

Company officials report an enthusiastic reception, both from military and WADC engineers, despite the fact that the new isolator does not meet the low natural frequency specs of MIL-C-17238.

► In Production—Bare currently is in production in MIL-Spec 0 (31) to 3 lb./rotated mounts and expects to be put during MIL-Spec 1 units (3.5 to 9 lb.) early this summer. Production of Size 2 isolators (1 to 40 lb.) will follow shortly thereafter.

Meanwhile, the first shipment of production isolators has gone out to Chance Vought Aircraft, which is employing them for portable use on the Republic model.

Applications engineering data on the new all-purpose mounts can be obtained from Barry Controls Inc., P.O. Box 235, Watertown 72, Mass.

Sylvania Plans Center For Data Processing

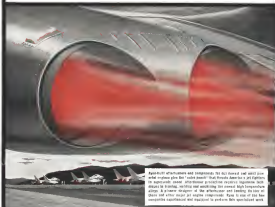
Sylvania Electric has announced plans for a company-wide electronic data processing center, built around a Raytheon Ion Beam Unit, one of several computers recently disclosed by members of the research industry.

The new data processing center, slated to be in partial operation by January 1970, will be headed by one of its own engineering officials, each of which in turn will be full production and financial information by four to six different offices within the area. Sylvania now operates 45 plants and 12 labs in 11 different states.

Other notable industry expansion include:

- Litton Industries, Beverly Hills, Calif., has purchased U. S. Engineering Co., Glendale, Calif., maker of optical electricity and electronics hardware.
- Rohr Corp. of America's new systems engineering lab (Arlington Wash.

RYAN AFTERBURNERS BLAST U.S. JETS AHEAD



Afterburner structures and components that Ryan built and used on what engine plus the "solid power" that breaks down for a jet fighter in separate main afterburner structure required separate high degree of fitting, testing and working that proved high temperature alloys. A primary designer of the afterburner and leading its use in design and other major jet engine components. Ryan is one of the few companies experienced and equipped to produce this specialized work.

Another Example of How

RYAN BUILDS BETTER

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Fuel Gage for the first Turboprop Airliner to go into service in North America

To obtain the smooth line needed to their operational requirements, Trans-Canada Air Lines and Capital Airlines chose the Vickers Viscount Turboprop. And to insure the ultimate in accurate and precise fuel gage systems, both lines have chosen the Simmonds Pacatron Lightweight Fuel Gage System. Now in its long record of firsts in fuel gage development, Simmonds is proud to add the installation of Pacatron on the first turboprop airliner to go into service in North America. In addition to dependable fuel measurement, the Pacatron Lightweight

Fuel Gage System also makes possible the addition of important functions of fuel measurement and control. These include: automatic master of gravity control (i.e. control of fuel weight distribution), low level warning (thermo-resistor level switches), and automatic load limit control in accordance with the flight plan. Simmonds fuel gaging systems are now flying on 90 types of aircraft and on 40 U.S. and foreign flag airlines — a record for which Simmonds is recognized the world over as "first in aircraft fuel gaging".



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Dec. 20 p. 11) will be located in Walnut, Mass., at 227 Crescent St., in a building leased from the Walfrum Watch Co.

• General Electric has formally opened its new 100,000-sq-ft system center in Syracuse which will serve as headquarters for its Heavy Military Electronics Equipment Department's development and manufacturing operations. HME department's activities include work on air defense radar systems.

• Radio Technical Commission for Aeronautics has elected five new directors. The new executives are: Robert Aronson, Inc., Oakland, Calif.; Hilco, Raymond and Brown, Inc., State College, Pa.; Continental Air Lines Division, Milwaukee, Wis.; Halsey, N. Y.; Northrop Aircraft, Inc., Hawthorne, Calif.

Avionics' Firms Tell of New Components

A new, non-removable push switch—the smallest and lightest styled, precision snap-action switch available, according to its maker, Micro Switch—is one of several recently announced aviation components.

Designated RS2, the switch is de-



NEW SWITCH—Smallest and lightest

equal for operation between —65F and 165F and has a maximum life expectancy of 900,000 operations, based on lab tests to date. Resistive rating is 50 v, d.c., 25 amp resistive, 5 amp resistive, 15 amp inductive switch. Switch meets an RS275 or RS275A criteria either normally open or closed. Data sheet P36 gives application data. Get part's address in Freepost, III.

Other new components include: • High-voltage sealed actuator, vacuum type designed to withstand types of airborne use, not suitable for a wide range of input voltages. Typical unit is rated 1,100 v, max. input; 1,420 v, d.c. output, 14 ms. at 54C soldered into a resistive load. At 77C, unit delivers 1.2 ms. at 1,350 v, d.c., from 2,110 v, max. input. Unit measures 51 in. long by 6 in. in diameter. Bulletin H-2 gives application data. Write: Intertek Rectifier Corp., 1521 E. Grand

From Wyandotte... answers to modification & maintenance problems



North Plant (above) on the Detroit River is part of Wyandotte's vast manufacturing facilities. Here, and at Wyandotte's newest plant in Los Angeles, Calif., specialized products for the aircraft industry are manufactured.

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6. Washing aircraft interiors	Alkane [®] (R291)	An excellent solution cleaner for regular aircraft maintenance.
7. Fuel sampling	Specure	Aircraft fuel system. Meets Specification AF 1425 C.
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9. Washing engine cleaning	197	A general low foaming, non-staining detergent. Meets Specification MS-C 2243.
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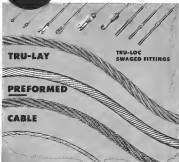
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on pulleys.

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Tru-Loc swaged fittings

- Guaranteed to hold to the rated breaking strength of the cable with which used
- Designed and developed to eliminate the necessity for costly installation sliping
- Provided in sleeve type, ball-type, spigot, ball-withstrap, and Center-Pull loop fittings.
- "Quickset,"—specially developed double-shank ball-type terminals—make it possible to connect and disconnect control sections in an instant without the use of tools.

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• **Dielectric potentiometer**, Type PD-1, provide a variable voltage divider that is free of phase and frequency distortion over the wide range of 20 cps to 10 mc., according to manufacturer. Attenuation range is approximately 25 db; resolution is infinite, and a wide variety of input impedances can be provided.

Manufacturer: Teknopak Instrument Corp., Acton, Mass.

• **Sensitive relay**, Model 100-B, requiring only 25 mw. per contact yet repeatedly providing thorough contact system action, is available from Helix Tele Technical Corp. Unit is available in SPST or DPDT styles, with coil resistance up to 10,000 ohms, contact rated 1 amp. inductive, 1/2 amp. resistive, with dust cover or hermetically sealed.

Company's address: 640 West Mt. Pleasant Ave., Livingston, N. J.

FILTER CENTER

• **Novel Microwave Amplifier**—Solid-state beam amplifier, a new type of tube developed by General Electric for amplifying microwave signals in a direction beam of periodically varying direction down which the microwave signal travels. GE says application is advised without external circuitry.

• **Radically New Yaw Damper**—Bearing reportedly has developed a radically new type of yaw damper for the B-52 which gives neither airframe nor fuselage stress. One observer reports the device is so simple that "it would even frighten Ed Heppner."

• **ACCA Problems**—Gore talks between the aircraft and defense control systems in the cable data link used to automate GCA appear at present to leave the dynamic performance of ACCA. This observation was made in a paper by Douglas Galtman and Richard Lohrby, Wright Air Development Center engineers, presented before the recent annual IAS meeting in New York. The authors reported that the introduction of ground computer site signals and its transfer to computer processed data amplification of radio transmitter noise and an incompletely explained 6-cycle interference. In one test using a plane equipped with amplifier and computer, it was reported that the signals were de-

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POWER OUTPUT: 200 watts.

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UNINTENTIONAL OPERATION of two channels not required on three channels AT or FT.

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NOTE: D.C. legal voltage stress is a conservative 1 V (with full allowance for design & manufacturing tolerances). D.C. legal average stress is shown at 20°C with legal

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locked from stop to stop in synchronism with the previous 4-cycle axis

► **New Transistor Chopper**—A static type of chopper for converting d.c. signals to a.c., which uses transistors, can be operated at frequencies up to hundreds of kilohertz, opening up the possibility of servos with extremely fast response times. A. P. Krupar of Westinghouse Electric Corp. told the above-mentioned meeting of the ASEE. Some of the advantages of transistor choppers, according to Krupar, include

- Low-level operations at signals of a fraction of a millivolt.

- Wide temperature range operation between -50°C to 90°C with permanent functionality

*Small size, weight, and power are a major concern.

- long life, compared to mechanical choppers, whose constant putting and turning may be a problem.

• **PGANE Sessions Scheduled**—IRE's Professional Group on Acoustical and Navigational Electronics has scheduled three technical sessions during the national IRE convention in New York, two at the Waldorf-Astoria on Mar. 22, the third on Mar. 24 at Kingsbridge Armory. Some of the papers slated for presentation include:

• A Concentration Theory Approach
Toward The Design of Aircraft Instru-
ment Displays

- Variability of Floated-Type Rate-Integrating Control in Systemic Applications

• **High-Precision Computer for Automatic Solution of the Celestial Triangle.**

• **Junco** A High Precision Lightweight Aircraft Navigation System.

► **UAL Evaluates Radar-Brexit Radio** and Radar Corp. of America has announced emerging results of United Air Lines' evaluation of their respective Global stores wearing radar. Outcome will determine which data packets a 54 million order for worldwide equipment. RCA's radar has been under test for about a month. Tests on the Radar-Brexit, which is slightly higher powered than RCA's, will get under way shortly.

► **Transistor Frequency Standard.** American Time Products has announced a new transistorized frequency standard, operating from 20-15 v. d.c., which puts out 50° w. at 400 or 500 cps. Device weighs 7 oz., comes in an octal-based can, measuring 14 in. dia. by 4½ in. long, and is available in three different models, one of which reportedly holds its frequency within 0.005% between -55°C. and 85°C. Manufacturer's address is 390 Fifth Ave., New York 18, N. Y. —ED

REPORT GENERAL NOTES:
CHEMICAL ENGINEERS, CHEMISTS
ELECTRONIC ENGINEERS, AND
MECHANICAL ENGINEERS. PHYSICS
AND METALLURGICAL ENGINEERS



HIGHER PAYLOADS and HIGHER PERFORMANCE

This compact, light-weight rocket powerplant, designed by the U.S. Air Force as the XR33-AJ-3 liquid-propellant rocket, has been successfully flight-tested on the Republic F-84F airplane. Used for assisted-takeoff, this powerplant and its big brother, the YR33-AJ-1, which was extensively flight-tested on Boeing's B-47E bomber during 1954, have paved the practical application of rocket power to piston aircraft.

SOLID AND LIQUID-PROPELLANT ROCKET POWERPLANTS FOR MISSILE AND AIRCRAFT APPLICATION • JET-ENGINE THRUST REVERSERS (DEFENSE) • AERIAL POWER UNITS AND GAS GENERATORS • ELECTRONICS AND ORDNANCE • ORDNANCE (BOMBS) • EXPLOSIVE ORDNANCE AND MINE HEADS • UNDERWATER PROPULSION DEVICES • ARCHITECT ENGINEER SERVICES FOR TEST FACILITIES

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NOISE POWER FOR AIR POWER



DARTS ON THE LINE at Rolls-Royce Derby plant. Four Darts power the Viscount.

periods, which is now 1,050 hours on British European Airways' Darts, you should regard the oil in the piston plants as an engine part which requires changing only at engine overhaul.

► **Why So Low-Here** are the reasons. Less risk for the Dart's low consumption.

► **No contact** of the oil with products of combustion, as in a piston engine.

► **Temperature** has no deleterious effect on the oil, as it is well within the latter's operating limits.

► **Oil is reduced** for jet engine use.

The only annual loss of oil in the engine is from leakage past seals and by compression, says Enns.

Oil economy is lost, however, because of the dust and propeller ingestion.

The Darts scores at every 50 hours and loses in a loss of 2.4 pints of oil.

The latter expectation is performed every 300 hours and costs 9.6 pints of oil.

However, Enns says "Aircraft operators are developing reliable methods for measuring that oil and reusing it once it has been found that Euro Turbo Oil 55 does not undergo any appreciable change even after constant use for the overhaul period of the Dart engine under similar operating conditions."

Enns adds that this behavior is the only of approved by Rolls-Royce for use in the Dart.

The Turbo Oil 55, as used in the Dart, may be "recharged," says Enns.

The recharging process is made out of removing contaminants by centrifuging the oil. Foreign contaminants are lost or the, ingested into the engine during normal operation, plus any volatile particles which may come from the engine itself.

Yield of capacity of the Dart is 25 percent more.

Capital expenses estimate that oil cost of the Dart per engine operating hour will be substantially less than for a comparable piston engine.

► **Engine Break-Down** Coffey Enns, Captain's Viscount piston engine, told Aviation Week that the latter considers engine breakers a security

risk for Viscounts because the piston will be equipped with Airbus doors, starting with the fourth aircraft.

This means that passengers will be walking in front of and quite close to the propellers. So the airline wants to have a positive means of making sure that the propellers will not be running after landing (the Darts ordinarily will shut off a second after takeoff).

Capital also does not want to take the chance of a propeller windmilling if the aircraft is parked head-on into a strong wind while passengers congregate in front of the engines. Also, the latter would keep the engines from turning over while mechanics work on or around them.

Viscount considers that the Viscount's engines could windmill if the aircraft were heading into a strong wind. But as a practical matter, Viscount met, the probability of windmilling is slight because of the large reduction (going from 18,000 to 10,000 rpm) between propeller and turbine for every revolution of the propeller, the engine would have to rotate about 11 times.

One point under debate at Capital is whether to equip all four engines with breakers or just the two port power-

plants (since the Airbus door will be on the left side of the airplane).

► **Goodyear Brake-Down** breaks under consideration by GAF suggests it is a single-link-type Goodyear aircraft engine brake. The unit can be operated in several ways, such as electrically, manually or hydraulically. If the latter, unit is provided with an accumulator, allowing brake pressure to be applied for extended periods of time.

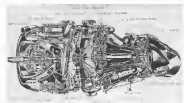
A problem of the brake from Gipsy's point of view is that it is designed to be mounted on an accessory drive pulley. This means that all loads imposed on the engine by the brake are lessened through the entire accessory section gear train to the prop shaft.

A Viscount representative told Aviation Week that Indian air bases, concentrated in England for the Darts, although none is currently installed on existing aircraft. He expressed the belief that any brake eventually used on the Viscount would be a field/roll-back-developed unit, because of the "technical connection" between brake and powerplant.

► **Dart Test Cells** testing R2080 engine test cell at GAF's overhaul and maintenance base in Washington is being converted to Dart use to allow the engine to overhaul and test the turbochargers. A converted, truck-type, mobile test stand is being built to take out of the R2080s.

An innovation in the Dart test stand installation is that an electronic drive motor will replace the classic drive pump to operate electronically any desired load on the turbocharger powerplant and maintain it simultaneously. The electronic dynamometer is more accurate, simpler and allows a cleaner installation than geared engine frequency-measuring means of checking a turbocharger engine. BMEP gains obviously cannot be used with a turbocharger.

The dynamometer requires consid-



CUTAWAY OF DART TURBOFAN ENGINE



Air Force Jet (right) (left): Chief of Flight Test and R. J. Leach. Below Test Pilot check the 707 before a test flight.

Boeing's jet transport is off to a good start

Day by day a big jet airplane is writing history in the sky over Seattle. The Boeing Stratoliner Stratoliner has exceeded previously every expectation of its designers.

In the north following its first take off, the 707 flew on its own, a remarkable feat. By early October it had completed the entire first phase of flight tests, and today is on the schedule. It has done well in the air, and had conversations had proved surprisingly low. Impressed by its performance, the Air Force has ordered a larger version of the prototype replace into production.

What has behind the early success of this revolutionary transport? One factor is Boeing's unsurpassed experience in designing and building such jet aircraft. Another is collaborative research in the company's home base since it is used to achieve efficient and long observations. And a third is a small production staff. The 707 incorporates many (unusually tested) features from other Boeing jet aircraft. For example, post inspection of engine interiors both before and after of maintenance.

The Stratoliner Stratoliner's clean aerodynamic principles proved in more

than a thousand Boeing, as yet, B-47 bombers and is the eight jet B-52's which now is in quantity production to become America's front-line heavy bombardment weapons.

In addition, in the period since World War II Boeing has produced more than 600 military C-97's and 55 commercial Stratocrafters. The C-97's perform almost all the aerial refueling operations of the U. S. Air Force. They also serve as high priority personnel and cargo transports. The Stratocrafters are the acknowledged queen of transoceanic passenger service.

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able cooling—approximately 1 gpm of water for every 13 hp absorbed. This means that minimum requirements of more than 117 gpm are needed to cool the unit when rating the Dart up to 1,500 hp.

The most economical way to obtain cooling water at these flow rates is to have a tower through which to circulate the water, according to Capital. Two electrically driven centrifugal pumps will move the fluid. In addition to cooling the water tower, the airline is also getting ready to install two sump tanks which the water will be drawn and stored when the water cooling system is not in use. This will prevent water from freezing in the tower during cold weather.

► **Retest-Built Equipment**—Although most of the equipment on CAP's Viscount is American, several British built components have been retained on the aircraft. Among them are three Rolls Royce engines to power the cabin. Moreover, cabin pressure differential is 6 ft. This gives an level cabin pressure up to 15,000 ft. altitude and 5,000 ft. increase altitude at 30,000 ft.

Other British equipment on CAP's Viscounts includes Bristol propellers, DeLaval wheels, brakes and tires. Most are original designs, and Macdonald ADF completes equipment.

► **Wike Macdonald**—Here are the reasons Capital engineers gave for selecting English sales company equipment although all other companies and radio units on the plane are U.S.-made.

"The Viscount was designed for high-mounted ADF systems... Several inquiries for ADF systems with high-mounted antennas were forwarded to American manufacturers. They replied that they did not have anything in production at that time. One company gave an estimated date of May 1955 before it could produce one.

"This date was unsatisfactory for Capital, and close investigation of the Macdonald ADF indicated the availability of high antennas and their satisfactory operation with other Viscount units.

"Since the Macdonald ADF is a compact and up-to-date system, Capital decided to use that system in Viscounts.

"We do not substitute any parts de facie, as all electronic tubes, condensers, inductors, and resistors can be replaced with American parts. Other components, which cannot be replaced with standard American parts, will be carried by a Sparco-Vickers warehouse. Therefore, any parts should be readily available."

► **Special Systems**—"Special systems" are incorporated in the Viscount which are not normally found on current-day airlines. Some of them:

• **Thrusters and flaps** A special tie-in system between thrusters and wing flaps makes it impossible for flaps to be in



BONUS THRUST: NO PENALTIES



The addition of extra thrust to new jet engines with a combustion device weighing only six pounds is one of today's major engineering achievements—the result of successful collaboration between Janitrol and gas turbine manufacturers. Aside from its amazing light weight, chief features of the new Janitrol Post-Turbine Burner are ease and simplicity of installation, long life, high efficiency, and ability to be turned on and off repeatedly as required. In its present stage of development, this Janitrol combustion equipment gives the aircraft engine designer a new dimension of power—and current progress indicates a good potential for even greater power gains, with negligible addition of weight.

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Janitrol Engineering Division, One South 7th Broadway, Washington, D.C. 44202 and West Highway, Philadelphia, Pennsylvania, 44101 and 44102. Branch City, Mo., 3201 Grand Blvd., East Mach., 2208 Grand St., Springfield, Ill., 4441 Northland Blvd., Columbus, Ohio, 4000 North 4th

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Products and facilities of American Gyro Div. of Daystrom Pacific Corp. perfectly complement the products and facilities of Daystrom Instrument. American Gyro components and control systems are outstanding in a field demanding precision, accuracy, and ruggedness. Daystrom Instrument is proud to welcome this new member to the family of Daystrom Incorporated.

DAYSTROM INSTRUMENT, Archbald, Pa.

the full fires (45 deg.) portion of thrusts are full-on. When thrusts are more than one-third open, they cannot extend beyond 40 deg. This will reduce drag and keep the plane fully controllable during such maneuvers as a go-around, when thrusts might be pushed to the limit while they are fully extended.

■ **Gow and pilot.** There is a twin system between the landing gear extension and pilot systems. This prevents inadvertent gear extension until the plane has reached an indicated weight of 80,000 lbs. System can be bypassed at the pilot's option.

■ **Water and torque.** Each engine is equipped with a power restoration system. It works this way:

If, on takeoff, the engine reaches a given engine rpm, but a torque-measuring device indicates that the engine is not developing full power for that rpm, water methanol is supplied to the engine to bring it up to power. When full power is reached, the water is shut off. System is altitude-compensated so that engines which are developing full power for a given altitude will not receive water injection simply because of power deficiencies due entirely to operation in thinner air.

■ **Other options.** Capital sees it is the first Viscount operator to have a fire detection and extinguishing system installed on the forward and aft cargo holds. It uses Fowell detection and CO₂ extinguishers.

Passenger system on the Viscount has the sole duty of isolating smoker units and on the main entrance and rear compartment doors and two side-floor compartment doors.

As pressure in the seats is turned on automatically when the doors are closed and is shut off when the doors are opened. In case of passenger failure, a valve can be used to apply cabin air pressure to the seats. A check valve prevents cabin air pressure from leaking out through a broken line.

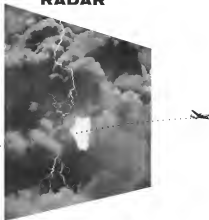
Thermal de-icers are mounted on the engines' hot films to keep them from becoming clogged with ice. "Ice" crystals remain cold weather operation.

■ **Albuquerque.** — **Washburn.** — Capital spokesmen are pleased at Viscount decision to open a warehouse in nearby Alameda, Va., where a large stock of Viscount spares will be stocked. The building, which Viscount will lease from Capital, will house a multi-million-dollar supply of parts, according to the airline.

CAP estimates that it is about all cases the worldwide market is eager to procure spares for the Viscount. This to get parts from the West Coast.

W. J. Young, Viscount supply superintendent, will be in charge of the warehouse operation.

RCA's NEW WEATHER RADAR



In the AVQ-10, RCA offers to place a much-improved system for preventing costly detours due to storms across their routes. Its ability to "see" into storms from miles away and to pick out turbulent paths through or between them, contributes greatly to passenger comfort and operational economy.

It is the first airborne weather radar to operate on "C-Band" (3.6 cm), the ideal radar frequency for storm detection and penetration.

RCA is proud to offer the AVQ-10 as a major contribution to commercial aviation's constant effort to improve passenger comfort and arrival time dependability.

LIGHTER

Weight has been cut to under 125 pounds for the complete system including shaft motors.

SIMPLER

Both mechanically and electrically, the elements of designed the AVQ-10 are clean, trouble-free up-sets.

SURER

A new design with simplified wiring, carefully selected components and an all-weather radar system, this new high standard of performance and reliability.

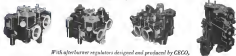
Antennas and sensitive operators are involved in such for more complete information.



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When the need arises, our jets must get up and at 'em just as fast as the enemy. The added power to thrust several tons of fighting craft into the air in a hurry -- to supply "bleeding-heart economics" for delivering the knock-out punch -- comes from the engine's afterburner.



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WESTERN AIRLINES

AVIATION CALENDAR

- Feb. 25-27—National Model Plane Show, Hughes Co. Auditorium, Cleveland
- Feb. 25-27—International Air Transport Ass., bi-weekly conference of airline job relations directors, Kohnen Hotel, The Hague
- Feb. 27-28—Fourth annual Ohio-Indiana Agricultural Aviation Conference, Fort Ave. University, Lafayette, Ind.
- Feb. 28-29—National Aviation Education Council, 58th annual meeting and convention, Hotel Statler, St. Louis
- Feb. 28-29—Associated Golden Globes of Southern California, with annual Pacific Coast Mid-Winter Souper, Chatterbox, Terry Room Glendale Park, San Diego
- Mar. 1-10—Air Line Pilots Ass., third annual safety forum, Sheraton Hotel, Chicago
- Mar. 15—Institute of the Aeronautical Sciences, National Flight Propulsion Meeting (invitation), Hotel Carter, Cleveland
- Mar. 14-16—Society of Automotive Engineers, production meeting and 1955 National Flight Conference
- Mar. 14-16—American Society of Test Engineers, 54th Western Industrial Exposition, Shreve Auditorium and Convention Hall, Los Angeles
- Mar. 20-21—Vice-Medical Ass., 20th annual meeting, Hotel Statler, Washington, D. C.
- Mar. 21-24—Institute of Radio Engineers, national conference, Waldorf Astoria Hotel, Kingsbridge Annex, New York
- Mar. 22-Apr. 1—American Society for Metals, sixth Western Metal Exposition and Congress, Flax Pacific Auditorium and Ambassador Hotel, Los Angeles
- Mar. 22-Apr. 1—Incorporation on Boundary Layer Effects in Aerodynamics, Bedford National Physical Laboratory, Tring, England
- Apr. 5-7—Radio Technical Commission for Aeronautics, spring assembly and joint meeting with the Institute of Radio Engineers, Los Angeles
- Apr. 6-10—World Glider Pilot & Trade Exposition, National Guard Armory, Los Angeles
- Apr. 14-15—American Guidance Ass., 25th annual meeting of Private Counsel Symposiums, Hilton Conference, Pacific NTR, Ft. Worth
- Apr. 26-30—American Association of Airport Engineers, 1955 annual convention and business meeting, El Comodoro Hotel, Tucson, Ariz.
- Apr. 26-27—Society of Automotive Engineers, Golden Anniversary Anniversary Meeting, Aerospace Production Planning and Aircraft Engineering Display, Hotel Statler and Mayfair Hotel, New York
- Apr. 28-29—American Society of Mechanical Engineers, District 14th spring meeting, including four section sessions, Lord Baltimore Hotel, Baltimore
- Apr. 29-30—American Kieit Society, spring meeting, Baltimore
- Apr. 27-28—Society for Experimental Space Analysis, spring meeting, Hotel Statler, Los Angeles
- Apr. 27-30—American Helicopter Society, 11th annual ocean, Hotel Mayflower, Washington, D. C.

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Skyhawk Oxygen Regulator Weighs Only 1 1/2 oz.

A manufactured oxygen regulator is one of the weight and space-saving features of the new Douglas A-1H Skyhawk, single-seat atomic bomber. In stead of taking valuable cockpit panel space, unit is attached directly to the pilot's standard A-11 oxygen tank.

The Scott Fernald equipment weighs only 1 1/2 oz., compared with the 48-lb weight of a standard regulator, the manufacturer says. Additional savings are provided by a 1-in. breathing hose containing integral microphone wires.

Variations available: Straight or curved, demand with diaphragm, or continuously pressure breathing.

Scott Aviation Corp., 375P East St., Lancaster, N. Y.



BUNKER is going on C-119 transport.

CAA Okays Light Flasher For Private Aircraft

Private plane operators can now get a navigational light flasher that is strong enough to survive the roughest handling by the pilot and his passengers, following approval of the device by Civil Aviation Administration.

The Bunk-R is being installed as standard equipment on Cessna's new Model 310 light twin-engine transport. The manufacturer reports. Military installations include the Cessna L-19, L-119 (Cessna 190) and the Hawkeye-Canada L-28 Beaver.

A built-in feature puts the lights into

a "steady-on" condition should the running mechanism go out. A toggle switch can be installed so that the pilot has a choice of flashing or steady lights.

The unit has a sleek size of 6 1/2 to 12 1/2 inches square, is fully shrouded and has a radio interference filter. It weighs 1 1/2 oz. and can be installed anywhere as a plane's wingtip or light cone. It measures 3 x 3/4 x 2 in., has three nickel-plated magnets to attract it to the fuselage. Operation can be on a 12 or 24-v. system and keep capacity is 5 amp. Price is \$28.50.

Via Decca Aircraft Supplies, Tulsa-based Argon, Tulsa, Okla., N. Y.



PORTABLE HOBBLER makes clean cuts.

Light-Duty Hobbler Cuts 18-Gauge Stainless Steel

A lightweight portable hobbler that can cut all types of stainless steel up to 18 gauge, makes smooth and even sheet metal to 16 gauge, works at the rate of 42 in./min. and with a maximum cutting width of 4 in., the manufacturer reports.

Using a punch and die action, the tool takes out a tiny metal slug with each cutting stroke, leaving all cuts clean, without distortions, burrs or chatter on either side, it is stated. It can be used in a hand feed or vibration-feed for bench operation.

The manufacturer also is producing a special head for cutting corrugated metal and a new 30-deg. die holder for its heavy-duty hobbler for handling up to 14-gauge stainless. It can work to a square corner on a 90-deg. turn without scrap loss, it is stated.

Farmer Machine Co., 361 North 23 St., Philadelphia 3, Pa.

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back speed to hold speed within desired settings, with less than \$200, complete with motor.

Both one-quarter and one-half inch are available with choice of either 1,500 rpm or 1,000 rpm on base motor speed. Both motors are stated to supply constant torque over a 50:1 speed range. Only a screwdriver is necessary to replace any part, the valve says. All operation, operation and the like are fully explained within a single plastic assembly by means of a lead spine ring.

Servo-Tek Product Co., Inc., 1085 Coffee Rd., Hawthorne, N. J.

ALSO ON THE MARKET

Variable delivery pumps for hydraulic systems requiring constant high pressure from zero to full flow are made in two models. Series PVM-600 with hand wheel control for manual adjustment and Series PVM-600 having automatic regulation. Units generate continuous duty pressure to 5,000 psi, deliver 3 gpm at 1,200 rpm, at maximum continuous speed of 2,000 rpm they deliver 4 gpm and provide over 11 hydraulic horsepower—Dedco Division, New York Air Brake Co., 1700 E. Ninth Mile Rd., Hazel Park, Mich.

Fluxless soldering is possible using Alcon solder gun, a magnetostatic transformer driven by an electronic gas heater. The transformer releases the surface oxides beneath the pool of molten solder and wetting is completed before



any oxidation occurs, the solder wets. Unit weighs 50 lb. and powers for operation from 60-cycle 115 v. source. Bench space 10x14 in.—Alcon Systems, 25-21 Weyman Rd., Free Lane, N. J.

Redesigned circuit going into all Metron engineering equipment is stated to increase life of these units about five times. Latest circuit permits use of rugged multiple-stage induction coil in any units purchased—Metron Instrument Co., 431 Lincoln St., Denver 5.

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February 1, 1955

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determining selectivity is accentuated by the departure of other specialized new tax funds from the field.

► **Group Securities**—The only other remaining specialized aviation trust in the Aviation Fund of Group Securities, Inc. This fund has met with indifferent results, despite a booming aviation market. The reason may be due to its selling refuge in wide diversification and heavy sales of aircraft shares.

Total assets of Group Securities Aviation Fund aggregated \$2,542,844 as of Nov. 18, 1954, up from the \$1.6 million a year earlier. Net security profits amounted to \$199,314 last year. Major transactions during 1954 included the sale of 3,500 Lockheed, 2,300 North American Aviation, 1,800 General Dynamics, 2,340 Cessna Aircraft, 600 Beechcraft, and 1,700 Bonanza. Acquisitions consisted mainly of 2,000 PanAm, 2,500 National Airlines, 1,000 Curtiss-Wright "A."

Holdings of Aviation Fund, as of Nov. 30, consisted of 11,400 American Airlines, 400 Eastern, 700 Chance-Vought, 4,800 Curtiss-Wright "A," 2,300 Douglas, 4,500 Eastern, 1,500 General Dynamics, 1,600 Lockheed, 6,000 National, 3,800 North American Aviation, 2,800 Pan. American, 2,000 Sperry, 2,200 United Aircraft, and 5,500 United Air Lines.

► **Massachusetts Investors—Massachusetts Investors Trust**, the country's largest general type investment trust, with net assets of more than \$791 million, on balance continued to add to its aircraft commitments. Last year new purchases included 35,000 United Aircraft, 25,000 North American, and 10,000 Douglas. The Chance-Vought shares acquired from United Aircraft were sold, along with 20,000 General.

At the 1954 year-end, its aviation holdings were concentrated in 70,000 Douglas, 150,000 North American Aviation, and 115,000 United Aircraft.

Interestingly enough, MIT's three aircraft investments was valued at \$27.6 million at the 1954 year-end (compared to \$8.3 million a year earlier) and exceeded by a wide margin the total assets of National Aviation Corp., the largest specialized aviation fund.

► **Standard the Best**—As a group, general type investment funds showed a fairly little interest in aviation shares.

A number of the country's major trusts have persistently declined from buying any aviation shares in recent years. In retrospect, this avoids a significant lack of understanding by professional money managers.

Equally significant, it isolates that the aviation industry—particularly the airlines, who may have later used for substantial capital—have no customer into the multi-billion aviation funds controlled by these general investment trust funds. —Selig Altschul

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COCKPIT VIEWPOINT

By Capt. R. C. Robson



The Turbulent Terminal

If air traffic control can rightly be called one of aviation's biggest headaches, and it can, then the terminal area dilemma is surely no less for the rule of The Magnificent Magazine. The vast speed differentials of today's air vehicles require that any serious head-on velocities from now up-and-out do it safely. And in a crowded terminal area, this can get interesting.

Nationwide groups have taken a whack at solving some of these problems, mainly as laboratory studies, and various authors have drawn from this work. One idea that consistently crops up is that it is possible to size everything from jets to helicopters in one traffic pattern and not only maintain an orderly and safe flow of traffic but also achieve very close spacing.

► **Two Conclusions**—One recent evolution—using a dynamic translation—went on at great length for some 57 pages of graphs and formulas, covering many hours of work and thousands of computer dollars in an effort to shed light on the subject before coming to two main conclusions:

1. That high-speed terminals are needed on the instrument landing runway end.

2. More work should be done in order to evaluate the problem fully. (This last, incidentally, is standard fare in such work. Possibly because it means more thousands of dollars.)

The theory that all kinds of aircraft can be mixed safely around one airport never has made much headway among pilots. This may possibly be due to the fact that too many of us have been badly scared when we came bumping up behind a helicopter (and pity the poor copter pilot), or try to follow or dodge a jet.

In most of these cases it is difficult to know who's looking who. Scramble on the hour or so apart at the local airport merely looking around would give just as much and certainly would be cheaper.

► **B-47 Backwash**—On the practical side of the evolution bridge was a recent experiment by one of CAA's runway flight inspection pilots who tried following a B-47 through various distances. (Hardly to be used that at one mile but.) Turn-back was violently uncomfortable, at two miles uncomfortable, at three miles violent, and at four miles barely possible.

Similar experiments have been tried by others, with substantially the same results. Apparently this turbulence factor didn't show up in the simulator, but it had better not be ignored lest huge numbers of passengers start bawling at the control section of their standing pilots.

Incidentally, it is often wondered around the industry why more are not made of these CAA runway inspection pilots and the information readily obtained from them. These pilots must be built square, built into sound and good enough to fly every mile of inland runway with extreme accuracy.

► **Backwash Knowledge**—Their operation should be the industry's practical workshop.

Of course, since these CAA pilots do not receive enough money for the work they are now doing (I discuss not nearly so much as a three-year salary on pilot), the rate will need increasing. But on the other hand, where else can it really get so much for so little?

This sort of hard-of-operational knowledge could produce answers to many questions connected with traffic control, instrument flying, airport lighting and problems known what else. We certainly keep enough ground laboratories as business, why not make use of the built-in flying laboratory as a source of getting information on many of our long-debated issues?

(Editor's Note: Aviation Week gives Capt. Robson an opportunity to express himself freely in this column. Comments from readers as his opinions are welcome.)

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Examiner Wants Nonsked Group Grounded

- Board official says North American combine violates Civil Aeronautics Act and CAB economic regulations.
- Report charges the four-airline operation deliberately posed as a single carrier offering scheduled service.

By Craig Lewis

Elimination of the North American combine from commercial air transport operations was recommended last week by Civil Aeronautics Board examiner William F. Cough.

The examiner found the combination of airlines to be in violation of the Civil Aeronautics Act and the CAB economic regulations.

In dealing with the compliance case, known as the Twentieth Century case, former president, examiner Cough found:

- Stanley D. Weiss, James Fackend, Jack B. Lewis and R. A. Hart, individually and in partnership, and North American Aircraft System, Inc., have violated the Civil Aeronautics Act;
- Twentieth Century Air Lines (here called North American Airlines), Trans National Airlines, Trans American Airlines and South Atlantic, doing business as Hemisphere Air Transport, have violated the Act and the economic regulations;
- All violations were knowing and willful.

Letters of notification of Twentieth Century, Trans American, Trans American and Hemisphere, and North American Aircraft System, should be issued to each and direct them to cease violations of the Act.

Legal Maneuvering—North American attorneys have been attempting to keep Cough from issuing his report until a finding is made in the New York-Chicago case. The members added the U.S. Court of Appeals to instruct CAB to proceed with the New York-Chicago case before the compliance case, but the court issued three denials, and the Board resumed the report.

The case started in March 1951 as a compliance case by the effect of new policies of CAB. After extensive legal maneuvering in CAB and in various courts, hearings finally were conducted last July and last filed last fall. Now

the examiner has filed his report and the parties involved will face the Board.

The proceeding is concerned with the corporate identity, constructed by the four individuals who form the core of the North American operation: Weiss, Fackend, Hart and Lewis were found by Cough to control the whole operation either directly or indirectly.

Illegally Disguised—In the center of illegal combination of operations, the examiner said, "It is abundantly clear that respondents, Twentieth Century Air Lines, Trans National, Trans American and Hemisphere have conducted combined operations so as to render a frequent and regular service not permissible under the hatched authority granted in . . . the economic regulations."

The report also found "There can be no doubt but that these activities on the part of the respondents are purpose designed to support the general belief that 'North American Airlines' is a single entity conducting regular and scheduled air transportation service."

Even the respondents Weiss and Lewis, who conducted with various plans of advertising and by the North American combine, "the examiner stated, "were sometimes at a loss to identify the company in the group operated in so the advertising. None of the sole voice and extensive advertising paid for by the respondents carries any information which would notify the public that the service offered are of an intricate nature or that an carrier posed completely unopposed. The character of such a situation is (more fully) apparent."

Ticketing practices and by the North American operation were found to be in violation of CAB's economic regulations.

Carrier's Argument—Substantial part of the North American group's defense was concentrated in questioning the validity of the act of the act and the economic regulations applied in the case. Cough reviewed them thoroughly and concluded that they were both valid and applicable.

'Radical Penalty'

The carrier's noncompliance was described as "a radical and sudden move to proceed in the North American Airlines project," said Lewis. "The act of respondents in 'The Queen in White' in 'Wonderland' who went around screaming 'Off with their heads' is precisely the same move."

"The end result of this case is whether the regulations of which violations were charged are valid," says Lewis. "We believe they are not."

The only question is the likelihood of the Board's regulations and the will, at some time, to be decided as such. North American will have no direct interest in seeing public action be not made their regulations.

The North American combine pointed out that it was an approved for certification in four route areas—New York-Chicago, Denver service, South-west-Northeast service and New York-Florence—and that invocation of authority would eliminate them from air transportation.

Cough observed: "It certainly appears that respondents took a calculated risk when they devised this plan to conduct air transportation operations in violation of the Act and regulations. In my view, if confidence is to be given to this argument, regulations of the air transportation industry is sustained by the Congress . . . would already cease to exist."

"Any party acting under such circumstances, set up as an transportation service, is surely engaged in the act of deception, and, by the simple expedient of filing an application for a certificate of public convenience and necessity, the illegal operation could proceed completely unopposed. The character of such a situation is (more fully) apparent."

Revoked Regulations—The report concluded: "On the part of the respondent it cannot be found that respondents were particularly concerned with the public interest but, on the contrary, they were interested in private gain. This was to be achieved in very diverse plan operations clearly calculated to evade and circumvent, if possible, the express provisions of the Act and the regulations therewith, or

if such be to disregard the Act and the economic regulations pertaining thereto."

In view of the willfulness of the violations committed by the respondents, it was found that the only safe route available to the Board in order to compel compliance by respondent with the provisions of the Act and the regulations is to revoke the letters of registration of Twentieth Century Air Lines, Inc. (North American Airlines, Inc.), Trans National, Trans American and Hemisphere, and to order and direct to cease and desist from engaging in air transportation, and Cough.

The examiner also found that Weiss, Fackend, Hart and Hart, individually and in partnership in Republic Air Lines System, Twentieth Century Aircraft System, California Aircraft Co. and Standard Aircraft Co., and Trans American were jointly and severally liable to be ordered to stop violating the Civil Aeronautics Act.

Structure—North American Airlines is a network of operating and non-operating companies, all of which are under the authority to operate air transportation. Under the authority to operate these companies by CAB, they were also singular service and not to give in any kind of regularly scheduled operation.

It takes a number of companies and authorities to offer the volume of service as North American operation. Evidence in the case showed the standard had a direct service between New York and Los Angeles which was maintained as of last 17 days in 1952 and all but 19 days in 1951.

The last operating company in which the Twentieth Century, which has since changed its name to North American, Trans American, Trans National and Hemisphere. Since the case began, a fifth company, East Coast Express, has been added. There are the foundation of letters of registration under which the group actually flies.

Partners in Compliance—The Republic Aircraft System does the accounting and handles the revenue for the group.

North American Aircraft System handles promotion, advertising, sales and marketing for the four operating airlines.

Twentieth Century Aircraft Co. owns aircraft and leases them to the carriers, as do California Aircraft Co. and Standard Aircraft Co.

Weiss, Lewis, Fackend and Hart were partners in a series of partnerships in Republic Aircraft System, Twentieth Century Aircraft Co., California Aircraft Co. and Standard Aircraft Co.

Twentieth Century Aircraft Co. was formed, probably, originally to own lease air transport control over other airlines, and govern corporate operations including regulation of scheduling practices.

A key question involved was whether the loss individuals involved in the case actually controlled the companies in which they were not officers—whether the officers were actually directors set up in papers of Weiss, Hart, Fackend and Lewis.

Cough found that the four carriers, Twentieth Century, Trans American, Trans National and Hemisphere—were controlled by the four individuals.

Ownership—Even had it not been previously found that the alleged owners of the stock in Twentieth Century Air Lines, Trans National, and Trans American were jointly and severally liable to be ordered to stop violating the law, and if the name had been true, the evidence is substantial in showing that the beneficial ownership and control of the stock in the respondents, Weiss, Fackend, Hart and Hart, was in the hands of the four individuals.

In reference to testimony received from employees and officers of the companies who had been in the case, Cough said: "Certain of these witnesses, although designated as officers of the carrier respondents, were obviously agents of the officers of their company and it is clear from the record that they are not independent witnesses."

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JAL Future

- Japan's flag airline to try for big gains in 2nd year.
- But carrier needs more subsidies for operation.

Japan Air Lines, having taken a big bite of passenger traffic away from other carriers in its first full year of true-blue operation, is expecting its second year to be even bigger gains than this year.

In an extension of its Okinawa service, JAL is introducing twice weekly flights between Tokyo and Hong Kong. In addition, the airline plans to increase its present 50-70-hour operation to more than a third.

In the near future, the Japanese carrier expects further expansion of service to include regular operations of extended service to Brazil. A new flight of the proposed route from San Francisco to Sao Paulo was made last October and a second experimental flight is scheduled for Nov. 19.

Thriller Traffic—With an program for new equipment before 1957, JAL plans to handle all new services with its present five Douglas DC-6Bs, a fleet that thus far has been able to meet some expensive traffic needs.

With new plans laid on the San Francisco-Tokyo route, JAL is planning to handle 50-70-hour service to Brazil. A new flight of the proposed route from San Francisco to Sao Paulo was made last October and a second experimental flight is scheduled for Nov. 19.

At the 11th month of the year, JAL has 31 new 270-passenger jet planes and 29 DC-6Bs in the fleet of 1954, compared with 1953's 12-month work of 11-14 on the Tokyo-Honolulu run.

Aircraft Ratio—Lords cannot be accurately kept, since JAL runs maintenance services and numerous airlines with the changing demands for aircraft and first-class service. Maintenance, all first-class in 58, all tourist in 55.

These demands for each are resolved in a ratio ratio of 2.1 over first class. So far, most traffic is commercial. But JAL officials say are promising pleasure travel, especially for Japan's 10th anniversary. The 10th anniversary is being celebrated, and the airline hopes this will be the beginning of a steady influx of tourist traffic.

Financial Problem—JAL's biggest problem is to raise the 10th anniversary (1957) to give a full 10th anniversary tribute to the airline on the part of the Japanese government.

Koyama believes, however, that the



Dual Insignia on DC-6B

Designs of both Continental Air Lines and United Air Lines show the CAL Douglas DC-6B placed in service on South America Tokyo route operated partly under an exchange agreement. Continental's two other DC-6B transports operated under an exchange with American Airlines to Houston, San Antonio, El Paso and West Coast cities, also will carry dual identification.



Our Engine Development Problem

A language jet engine development program is being studied by the Department of Defense. Charles E. "Engine Charlie" Wilson, Defense Secretary, has publicly stated that he is giving the problem his personal attention because "it needs improvement."

"Over the past few years," Wilson said, "there have been too many engine development projects that have failed completely or have unusually delayed aircraft production."

Airframe manufacturers who have been victims of an engine program collapse and Pentagon planners who have seen their newest airplanes reduced to gliders for lack of suitable power will agree with Wilson.

The second is clear that the hundreds of millions of taxpayer dollars invested in jet engine development since 1945 have not yielded the dividends anticipated. However, sold the engine "bucket" production record, the development picture has not been bright. Of the five large engine builders, only General Electric and Pratt & Whitney Aircraft have avoided major development losses.

International Race

In the development race, international competitors have given the United States a tough time.

- For example:
- Britain has developed three turboprops in the 10,000-hp thrust class—the Bristol Olympus, the Rolls Royce Avon R.A. 25, and the Armstrong Siddeley advanced Supra. U.S. has only the P&W J57 in this class.
- Russian technicians developed the centrifugal flow Nene design to more than 6,000 lb thrust long before their U.S. counterparts. The Russian advanced Nene was powering the MiG-15 to crash over Korea when the P&W J48 was going into early production version of the Geyser engine.
- Three British engine designs have been reported into this country for production to fill holes in the U.S. development cycle—the Rolls Nene and Tyn centrifugal flow types and the Armstrong Siddeley Supra. Two large U.S. engine firms still are using British advanced designs and development staff to bolster their own programs.

There are indications that U.S. gas turbine teams may also be losing the race to develop the first truly supersonic engine. Much of this battle still is cloaked behind military security regulations, but the occasional rift in the security curtain is not encouraging.

• There also is evidence that in their recently urgent quest for more and more power American manufacturers neglected to develop a complete spectrum of jet types. As a result, domestic turbine manufacturers must turn to the French Marbore and the British Scour when they need low-powered, lightweight, economical jets for helicopters, trainers, missiles and target drones.

Wilson's Defense Department team charged with investigating the engine development picture has at least

two members with practical experience in the field and their presence must be hastening to the aircraft industry. Roger Lewis, Assistant Secretary of USAF for Materiel, has a long background in aircraft manufacturing. James Smith, Assistant Secretary of the Navy for Air, has the practical engineer's approach from his long experience as a pilot. Frank Newbery, a retired veteran of 45 years with Westinghouse Electric Corp. who is now Assistant Secretary of Defense for Applications Engineering, completes the probing trio.

Competition Needed

There are many pitfalls of the past that should be avoided in organizing any future engine development program. However, it is disturbing to note that in preliminary Pentagon planning on this score there was a strong tendency to establish rigid bureaucratic development standards and to further throttle the competitive spirit in the aircraft industry. Reduction of competition and blocking the development of new engines and projects often a superficial attitude of orderliness and economy. Anybody who has had practical experience with the problems of aircraft engine development knows that this is a mistake.

Competition has been the lifeblood of American industrial development and the aircraft engine industry has been no exception. Last the attraction of Pentagon superplanning appear too attractive, let's look at some of the past examples of what dependence on a single source of military judgment would have done to American progress.

Dangerous Decisions

We can still remember the pre-war Army Air Corps claim that the future belonged to liquid-cooled engines and its public abandonment of air-cooled development. Where would the thousands of air-cooled engines that powered the Thunderbolts, Liberator, Superfortresses, Corsairs and Hellcats of World War II have come from if the Navy had not kept air-cooled development alive?

What would have happened if the Navy's 1940 veto of the J37 design proposal had been final and there had been no USAF to pick up the option the Navy dropped?

What would be the future of the USAF subpropeller-powered fleet of transports for its aerial logistics system if its dependence of the propeller turbine in the pre-Korean years had not been backstopped by the determined effort of the Navy's Bureau of Aeronautics to keep the Allison T40 and P&W T40 programs alive and bank its scarce research and development dollars on faith in the future of the turboprop?

Anything that will not only the competitive spirit of the industry's engineers or the competitive standards of its managers will harm, not help, the future of American jet engine development.

—Robert Holtz

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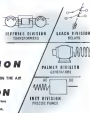
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